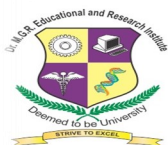


EFFECT OF YOGIC PRACTICES THERAPEUTIC EXERCISES AND COMBINED PRACTICES ON SELECTED CLINICAL PHYSIOLOGICAL AND PSYCHOLOGICAL VARIABLES AMONG LOW BACK ACHE MEN

Dr T Ekambaram



Department of Physical Education and Sports



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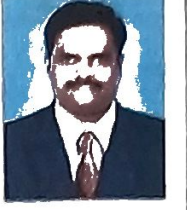
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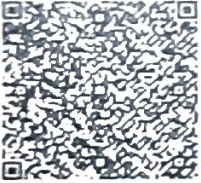
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Place of Study : POOMPUHAR COLLEGE(Autonomous), MELAIYUR.

"Ph.D. Degree has been awarded in accordance with the Minimum Standards and
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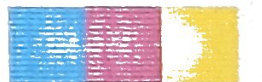
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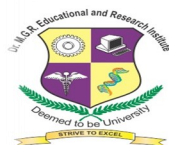
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COMBINED PRACTICES ON SELECTED CLINICAL PHYSIOLOGICAL AND
PSYCHOLOGICAL VARIABLES AMONG LOW BACK ACHE MEN**

Dr T Ekambaram

**Book Version of the PhD Thesis
submitted to Bharathidasan University**



Department of Physical Education and Sports



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EFFECT OF YOGIC PRACTICES THERAPEUTIC EXERCISES AND COMBINED PRACTICES ON SELECTED CLINICAL PHYSIOLOGICAL AND PSYCHOLOGICAL VARIABLES AMONG LOW BACK ACHE MEN

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PHYSIOLOGICAL AND PSYCHOLOGICAL VARIABLES
AMONG LOW BACK ACHE MEN**

A Dissertation

*Submitted to Bharathidasan University through the Research
Department of Physical Education, Poompuhar College
(Autonomous), Melaiyur, Nagapattinam in partial fulfillment of the
requirements for the Degree of*

DOCTOR OF PHILOSOPHY IN PHYSICAL EDUCATION

By

T. EKAMBARAM
(Reg.No.48460)

Under the supervision of

Dr. R.JAYACHANDRAN M.P.Ed., M.Phil., Ph.D.,
Director of Physical Education



**RESEARCH DEPARTMENT OF PHYSICAL EDUCATION
POOMPUHAR COLLEGE (AUTONOMOUS), MELAIYUR,
NAGAPATTINAM-609 107
TAMILNADU, INDIA**

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Instances where selected sources appear:

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Dedicated to

My Father Mr. M. Thulasiraman

My Mother Mrs. T. Indhumathi

My Father in law Mr. K. Babu

My Mother in law Mrs. B. Latha

My Wife Mrs. B. Jaganya

And

My baby E. Kathambhari

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T.EKAMBARAM

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VITA

T.EKAMBARAM

No: 33, Veera Nagar, Tiruvallur,

Tiruvallur District - 602001

Tamil Nadu, India

Email: ekambaramkutty@gmail.com

Mobile No: 9043391336

OBJECTIVE:

To approach a challenging career this can be tackled by applying my innovative thoughts skilfully in work, for enrichment of my own and enterprise

EDUCATIONAL QUALIFICATION:

Courses	Name of the Institution	Year of Passing
Ph.D., Part Time (Physical Education)	Poompuhar Collage (Autonomous), Melaiyur, Sirkazhi	Pursuing
M.Sc., (Yoga)	Tamil Nadu Physical Education And Sports University, Chennai	Jun2012
M.Phil., (Physical Education)	Tamil Nadu Physical Education And Sports University, Chennai	Jun 2011
M.P.Ed.,	Ramakrishna Mission Vivekananda University, Coimbatore	May 2010
B.P.Ed.,	Ramakrishna Mission Vivekananda University, Coimbatore	May 2008
B.A.,(Economics)	Muthurangam Govt. Arts College, Vellore	Nov 2004
Hr. Sec.,	Government Higher Secondary School, Valapandal.	Jun 2001
S.S.L.C.,	Government Higher Secondary School, Valapandal.	Jun 1999

WORK PROFILE:

Organization: Velumailu Siddha Medical College & Hospital, Sriperumbudur.

Job Profile: Physical Director

Experience: 7 years (July 2011 to till date)

Description: Increase participation and competitive representation within all focused sports across the whole college. Create successful teams, both boys and girls. Create a culture of weekend fixtures and set yearly quota for fixtures every year. To lead the raising standards of student attainment and competitive sporting achievement within the Physical Education Department and the wider college.

OTHER EDUCATION QUALIFICATION:

- P.G.Dip. in Swimming and Coaching., YMCA College of Physical Education, Chennai [2017-2018]
- P.G.Dip. in Yoga., Ramakrishna Mission Vivekananda University, Coimbatore [2009-2010]
- P.G.Dip. in Special Olympics., Ramakrishna Mission Vivekananda University, Coimbatore [2008-2009]
- P.G.Dip. in Fitness., Ramakrishna Mission Vivekananda University, Coimbatore [2007-2008]
- P.G.Dip. in Varma and Thokkanam., TNPESU, Chennai [2011-2012]

ADDITIONAL QUALIFICATION:

- National Cadet Corps (NCC -“C” Certificate “B” Grade) 2004
- National Service Scheme (NSS) 2001
- Physiotherapy First Aid
- Varma Therapist
- Sports Massage, (SAI NS NIS Patiala) 2018

TECHNICAL QUALIFICATION:

- State level Referee in Athletic
- State level Referee in Handball

- State level Referee in Kabaddi
- State level Referee in Kho-Kho
- State level Referee in Volleyball
- State level Referee in Throw ball
- State level Referee in Yoga

SPECILIZATION GAMES:

- Ball Badminton
- Handball
- Tennis
- Athletics
- Swimming

AREA OF INTEREST:

Sports Masseur, Yoga Practice, Volleyball, Basketball, Hockey, Football, Tennis, Table Tennis, Kabaddi, Badminton, and Cricket.

ACHIEVEMENTS:

- ❖ Participated & awarded 1st place independence day South India yoga championship 2010-2011 held at Chennai on 23.01.2011
- ❖ Participated of CICA Tournament in Handball Game held at Coimbatore on 11.09.2009
- ❖ Participated & awarded winner of kabaddi Inter-collegiate tournaments (university of madras 2003-2004) held at vellore on 13.11.2003
- ❖ Participated & awarded 1st place 1500 M Intramural games and sports (Muthurangam Govt. Arts College) held at vellore on 2003-2004
- ❖ Participated & awarded 1st place of Pole Vault Intramural games and sports (Muthurangam Govt. Arts College) held at vellore on 2002-2003
- ❖ Participated in NCC Inter Group Competition for Thal Sainik Camp SD/JD Boys 2003 held at Madurai on 09 Aug 2003 to 20 Aug 2003

- ❖ Participated & awarded 1st Place in Firing Competition (SD) NCC Annual Training Camp held at Thriveni Academy on 07 Dec 2002 to 16 Dec 2002
- ❖ Participated & awarded Runner of Kabaddi Bharathiyar day games held at vellore on 1999
- ❖ Participated & awarded 1st place of Pole Vault of Arcot Zone Meet held at valapandal from vellore on 1998-1999
- ❖ Participated & awarded 2nd place of 400 M Arcot Zone Meet held at valapandal from vellore on 1998-1999

PAPER PRESENTATION:

- o National conference on the role of sports sciences in achieving human excellence held at 13th and 14th March 2015 presented the paper on “**Effect of integrated yoga modules on systolic and diastolic blood pressure among middle aged men**”. Organized by Ramakrishna Mission Vidyalaya, Maruthi Collage of Physical Education, Coimbatore.
- o National conference on teaching-learning in physical education: quality concerns held at 18th and 19th March 2011 presented the paper on “**effect of varied yogic practices, walking & combined practices on stress of diabetic patients**”. Organized by Ramakrishna Mission Vidyalaya, Maruthi Collage of Physical Education, Coimbatore.
- o National conference on emerging trends in physical education and sports sciences held on 12th March 2011 presented the paper on “**effect of suryanamaskar & varied asana practices on selected physical fitness components among men college athletes**”. Organized by department of physical education, Bharathidasan University, Tiruchirappalli.
- o National conference on yoga: caring sharing and empowering held at 20th and 21st December 2010 presented the paper on “**effect of badminton training with yogic practices on selected physical and skill performance variables of school children’s**”. Organized by the department of yoga, TNPESU, Chennai.
- o National seminar on characteristics of an ideal physical education teacher held at 22nd and 23rd October 2010 presented the paper on “**Interpersonal skills**” Organized by Ramakrishna Mission Vidyalaya, Maruthi Collage of Physical Education, Coimbatore.

International Journals

- Published topic : “Effect of yogic practices and therapeutic exercises on selected biochemical variables among low backache men”
- Published topic: “Effect of yogic practices on selected psychological variables among low back men”
- Published topic: “ Effect of yogic practices on selected clinical variables among low backache men”

CONFERENCE / WORKSHOP

- National work shop on yoga “Own Yoga – Own the Life” held on 7th April 2011. . Organized by the department of yoga, TNPESU, Chennai.
- National work shop on “Modern Trends in Yoga and Allied Therapies” held on 26th March 2011. Organized by the department of yoga, TNPESU in Co-ordination with viniyoga healing foundation of India, Chennai.
- National work shop on “Physiological Adaptation on Training and Nutrition” held on 9th February 2011. Organized by department of exercise physiology and biomechanics, TNPESU, Chennai.
- National work shop on Track & Field “Planning, Construction, Rules and Interpretations” Dt., 24th and 25th January 2011. Organized by department of physical education, TNPESU, Chennai.
- National work shop on “Modern Trends in Scientific Sports Coaching” Dt., 29th and 30th October 2010. Organized by department of advance training and coaching, TNPESU, Chennai.
- National seminar on “Software Based Statistical Application in Physical Education” Dt., 17th and 18th December 2010. Organized by Ramakrishna Mission Vivekananda University. Coimbatore.
- National word shop on “Women Empowerment: Directional’s & Dimensions” Dt., 8th September 2010. Organized by Department of sports psychology & sociology, TNPESU, Chennai.
- National seminar on “Recent Development in Sports Sciences and Their Contribution towards Physical Education and Sports”. Dt., 9th and 10th April 2010. Organized by Ramakrishna Mission Vidyalaya, Maruthi Collage of Physical Education, Coimbatore.

- Work shop on “Officiating and Coaching in Volleyball” Dt., 10th and 11th September 2009 Organized by Ramakrishna Mission Vidyalaya, Maruthi Collage of Physical Education, Coimbatore.
- National conference on “Preservation And Propagation Of Indigenous Sports And Games Of India” (Jallikattu and Kalari) Dt., 26th and 27th March 2009 Organized by Ramakrishna Mission Vidyalaya, Maruthi Collage of Physical Education, Coimbatore.
- National seminar on “Multiple Approaches Towards Intellectual Challenged Children” Dt., 12th and 13th February 2009 Organized by Ramakrishna Mission Vidyalaya, Maruthi Collage of Physical Education, and Ramakrishna Mission Vivakananda University. Coimbatore.
- National Conference on “Presentation and Propagation of Indigenous Sports and Games of India” Dt., 28th and 29th February 2008. Organized by Ramakrishna Mission Vidyalaya, Maruthi Collage of Physical Education, Coimbatore.

SKILLS OBTAINED:

- ❖ Communicating to all grades/classes of people of the society
- ❖ Completing and accomplishing any given task.
- ❖ Taking initiatives and leadership roles.

PERSONAL DETAILS:

Name : T.EKAMBARAM
 Father's Name : Thulasiraman.M
 Date of Birth : 06/06/1982
 Gender : Male
 Languages Known : Tamil & English
 Marital Status : Married
 Nationality : Indian

Date:

Yours truly,

Station:

(T.EKAMBARAM)

CHAPTER - I

INTRODUCTION

Health requires the promotion of healthy lifestyles. In the last 20 years, a considerable body of evidence has accumulated which indicates that there is an association between health and lifestyle of individuals. The term lifestyle means,

“The Way of People Live”

Lifestyle is composed of cultural and behavioral patterns and life-long personal **habits (e.g., smoking, alcoholism and sedentary life style) that have developed through** process of socialization.

Many current - day health problems especially in the developed countries (e.g., coronary heart disease, diabetes, obesity, lung cancer, drug addiction, etc.) are associated with change of lifestyle. In developing countries, such as India where traditional lifestyles still persists, risks of illness and death are connected with lack of sanitation, poor nutrition, and personal hygiene, elementary human habits, customs and cultural patterns.

1.1 HEALTH

“Sama dosha samagnisca sama dhatu mala kriyaha”

The person, who always eats wholesome food, enjoys a regular lifestyle, remains unattached to the objects of the senses, gives and forgives, loves truth, and serves others, is without disease. The total of body, mind and spirit. It includes physical health, mental health, emotional health, and social health.

1.2 HEALTH STATUS

The Health Status is usually measured in terms of life expectancy at birth, infant mortality rate, fertility rate, crude birth rate and crude death rate. These indicators of health are determined by numerous factors such as per capita income, nutrition, housing, sanitation, safe drinking water, social infrastructure, health and medical care services provided by government, geographical climate, employment status, incidence of poverty and the like (Reddy and Selvaraju 1994; Dadibhavi and Bagalkoti 1994).

1.3 HEALTH STATUS IN INDIA

It is a well-known fact that India is, next only to China, the second largest country in terms of population in the world. But the health status of a great majority of the people is far from satisfactory as compared to China and other developed countries. However, over the last five decades or so, India has built up health infrastructure and manpower at primary, secondary and tertiary care in government, voluntary and private sectors and made considerable progress in improving the health of its population (Ray 2003; Bhat and Babu 2004).

However, India is one of the major countries where communicable diseases are still not under control. The incidence of new fatal diseases such as AIDS / HIV, Hepatitis-A is on the increase and tuberculosis and malaria still take a high toll. Chronic non-communicable diseases such as heart diseases, diabetes and cancer are also in the rise (Bhat and Babu 2004). Health risk due to high prevalence of alcohol and Tobacco consumption is also increasing. , India's dream of "World Class" health care delivery system is difficult to achieve.

1.4 YOGIC CONCEPT OF BODY

Pancha Kosha - the Subtle Energy Body or 'Five Sheaths'

The subtle anatomy of the humans is divided into five energetic sheaths known as 'pancha kosha'. Pancha, meaning five and kosha, meaning layer or sheath. This ideology describes the human being "*as multi-dimensional, with the source or foundation in a spiritual dimension.*" The so-called 'spiritual dimension' is pure consciousness which is hidden by the other four koshas, the outermost layer being the most dense, physical body. Each kosha can be thought of as energy vibrating at a different frequency. The physical body therefore vibrates at the slowest rate and the 'inner light of consciousness' or 'atman' vibrates at fastest rate or frequency. Although all five layers interpenetrate one another.

These five sheaths can be divided into three bodies:

1. **Sthula Sharira / Physical Body**
Annamayakosha
2. **Sukshma Shariria / Astral Body**
Pranamayakosha, Manomayakosha, Vijnanamayakosha
3. **Karana Shariria / Causal Body**
Vijnanamayakosha, Anandamayakosha

Of all these, Anandamayakosha is not bound by time or space and does not die. When the practitioner resides in this sheath, they have remembered or realized their true nature, reached enlightenment and health will pervade on all layers.

1. **ANNAMAYA KOSHA (Food Sheath)**

This describes the physical body composed from the five elements but mainly from food and water. Any malfunction in this kosha is noticed as illness or disease and changes to diet and exercise regime can offer remedies.

2. **PRANAMAYA KOSHA (Pranic or Energy Sheath)**

The Pranic or Energy Sheath comprises the **prana vayus , nadis and the chakras**. Hence it is also called the "vital sheath" or "vital body". **Prana** , the vital breath which man lives by, is the bridge between the gross and subtle bodies as well as between the other koshas. Any malfunction in this sheath is noticed as afflictions of the breath, sensory issues and nervous problems, therefore, **pranayama** is the most effective remedy.

3. **MANOMAYA KOSHA (Mental or psycho-emotional Sheath)**

The third sheath is concerned with the metabolism of emotion as it is mainly concerned with feelings and imagination. If emotion is either over-indulged or suppressed, the imbalance in this sheath will have a knock-on effect upon the pranamaya kosha and the annamaya kosha. Imbalance is signified by difficulties in relationships, worry and psychological issues. Remedies include visualization, meditation and mantra chanting.

4. **VIJNYANAMAYA KOSHA (Intellectual Sheath)**

There are two levels to this sheath, one relating more to manomaya kosha and being concerned with mental calculation and thought and the higher aspect relating more to anandamaya kosha and being concerned with our perception and will. This sheath is the seat of the ego or in Sanskrit, 'ahamkara' and malfunctions can include poor memory, confusion, communication issues, lack of will-power and a loss of reality. Mental exercises including mantra, meditation and spiritual study can harmonise the functioning of this sheath.

5. ANANDAMAYA KOSHA (Bliss Sheath)

The ‘bliss sheath’ is the seat of the inner essence or Atman and is where we metabolise our experience of Samadhi. The mind is said to rest in its intrinsic natural state which is pure bliss. There are no malfunctions at this level as the mind is free from ‘chitta vrittis’ or mental confusions and distractions.

The following five bodies can be distinguished by **Taittiriya Upanishad**:

Sanskrit	Translation	Explanation	Activated by
Anna-Maya Kosha	full of food	Physical body	Asanas
Prana-Maya kosha	full of energy	Energetic body	Pranayamas
Mana-Maya Kosha	full of instinct & emotion	Psychic body	Relaxation with affirmations
Vijnana- Maya Kosha	full of knowledge	Consciousness body	Ethics and moral
Ananda-Maya Kosha	full of bliss	Transcendental body	Meditation

ATMAN- Self

Atman is the *Self*, the eternal center of consciousness, which was never born and never dies. In the metaphor of the lamp and the lampshades, Atman is the light itself, though to even describe it as that is incomplete and incorrect. The deepest light shines through the koshas, and takes on their colorings.

1.4.1 CHAKRAS

The word ‘chakra’ means ‘wheel’ in Sanskrit. The yoga Upanishads (circa 600 A.D) refers to the chakras as psychic centers of consciousness. The seven chakras are located in the spine, in the subtle body surrounding the gross physical body. The subtle

body is not visible to the ordinary eye. Chakras are constantly moving, continuously absorbing, currents of energy. Each of the chakras resonates with a certain colour, sound and frequency. When the chakras function well, then energy flows unhindered through our system, which is utilized for our growth and development.

When these energy centers are awakened, they whirl in a clockwise direction and help to establish the inner balance, the key components for good health. When the energy flow in the chakras is clear and unhindered, then a person's body, mind and soul experience a sense of well-being. But, if the energy flow in the chakras is blocked, then, there is an imbalance in the person's being.

1.4.2 PRANA

Yogis say that chakras are centers of spiritual energy. This energy is called prana or life force. Each chakra contains a definite number of nadis and these nadis possess a tone or vibration. The chakra centers circulate pranic energy and energy is activated through these centers. Each chakra sends energy to the particular part of the physical body and correspondingly, the mental body too. Prana is a link between gross body and subtle or astral body.

The union of prana and mind with the self is the goal of Hatha yoga. There are three important Nadis in the spine. They are: Ida, Pingala and Sushumna Nadi.

- Ida nadi represents – negative force – flow of consciousness.
- Pingala nadi represents – positive force – flow of vital energy.
- Sushumna nadi represents – neutral force – flow of spiritual energy.

Nadis carry pranic currents to all parts of the body. It is said that there are 72,000 nadis in our body.

1.5 YOGA FOR HEALTH

Yogic exercises recharge the body with cosmic energy. This facilitates

- Attainment of perfect equilibrium and harmony
- Promotes self- healing.
- Removes negative blocks from the mind and toxins from the body
- Enhances Personal power
- Increases self-awareness
- Helps in attention focus and concentration, especially important for children
- Reduces stress and tension in the physical body by activating the parasympathetic nervous system.

According to Patanjali, one can attain this (the individual self with the Supreme One) union by controlling and eliminating the ever- arising ‘**vrittis**’ or modifications of the mind. He also suggests that the mind, in turn, can be controlled through the right kind of discipline and training. Patanjali says that there are basic obstacles pervading the mind that are not conducive to yoga practice.

He divides these **obstacles** into two groups:

1. **Antarayas (intruders in the path of yoga)**
2. **Viksepasahabhuvah (co-existing with mental distraction)**

There are nine Antarayas. They are,

1. Vyadhi (physical disease)
2. Styana (mental laziness)
3. Samsaya (doubt)
4. Pramada (heedlessness)

5. Alasya (physical laziness)
6. Avirati (detachment)
7. Bhrantidarsana (false perception)
8. Alabdha- bhumikatva (non-attainment of yogic states)
9. Anavasthitatva (falling away from yogic states attained)

The above obstacles blocks the flow of prana (life force) in Astral body (koshas and chakras) leads to ATHI.

This ATHI (stress) spreads from one place and occupy the entire body known as Vyathi (diseases). If stress occurs in the Astral body (sukshuma sarira) it reflects in the physical body (sthoola sarira). So as the result the entire body became prey to deadly diseases and disorders.

1.6 BACK ACHE

Back ache (also known "**dorsalgia**") is functional disorder. In this pain felt in the back that usually originates from the muscles, nerves, bones, joints or other structures in the spine.

The people should not be surprised that backache is so common when we understand the highly complex mechanics involved in the functioning of the spinal column. Since man became a biped, the *center of gravity* (COG) has become narrowed to a small zone (the area of one foot) as compared to the wide area of the center of gravity when we were four legged animals. The brunt of the weight of entire body has to be borne by the spinal column. While having to do this the spinal column also has to allow for enormous degree of flexibility. This is ensured by a highly complex organization of various anatomical structures such as bones, discs, ligaments, tendons, nerves, blood vessels and strong muscles. Any one of these structures could be injured or affected by

diseases or subjected to excessive stress and strains thus contributing to pain in most mobile parts of the spine namely the neck and lumbar region.

1.6.1 HISTORICAL PERSPECTIVE

Lumbosacral pain has been a recognized human affliction for a long time. Hippocrates also talked about lumbosacral pain. In western medicine, we find the very first reports on naked eye descriptions of the normal and degenerate spine in the writings of Vesalius in 1555. Virchow first described what is now known as a lumbar disc prolapse in 1875. Middleton and Teacher first described lumbar disc herniation. Goldthwaite in 1905 described the result of manipulating the lower back of a patient who was thought to be suffering from a sacroiliac subluxation.

1.6.2 A GROWING PROBLEM

Backache is remarkably common. At any one time some 30-40 percent of the population have backache and between 80 and 90 percent experiences it at some time in their lives. It affects both sexes and all ages, from children to the elderly, but is most prevalent in the middle years

The major reason for this increase in the incidence seems to be related to the sedentary stressful modern life style of hurry and speed.

In USA, national health statistics in 1995-96 reported that 14.3% of out patients (new visits) are due to low back ache and 1, 29, 00,000 visits/ year are made for chronic low back pain. In addition 1, 00,000 patients visit Chiropractors. 52, 59,000 office visits are made for physiotherapy/year. 2.8% of severe hospitalizations are for back pain.

Trends in sick certification:

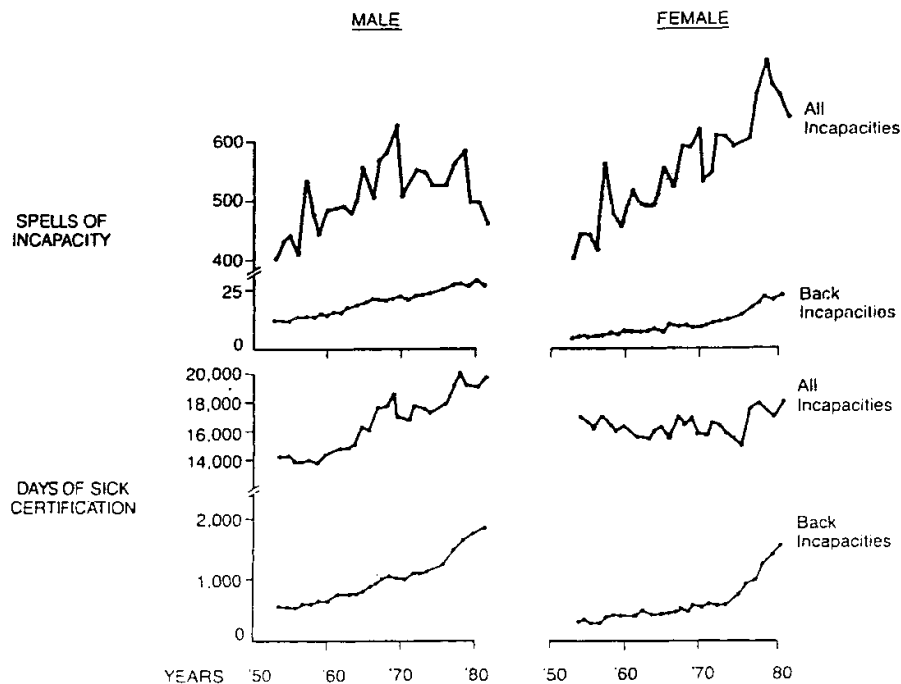


Fig. 1.

Annual statistics for England and Wales, United Kingdom (1950-1980).

The total cost is calculated as being nearly 6,000,000,000 Pound per year in UK and 16-50 billion dollars in USA, for the medical treatment provided, the benefits received, and loss of production-a phenomenal sum.

1.7 STRUCTURE AND FUNCTIONS OF SPINE

The spine or back bone is known medically as the Vertebral column. Its role is to support the whole body, be capable of bending and twisting in all directions, and at the same time protect the vital structures, such as nerves, that run through it.

1.7.1 THE SPINAL COLUMN

The human spine has a double S shape and consists of a column of 33 bony blocks known as vertebrae, which sit one on top of another to form the vertebral column. The spine can be divided into five regions:

- a) The Cervical spine consisting of 7 upper vertebrae, which support the head and allow the neck to move in all directions.
- b) The Thoracic part consists of 12 vertebrae, each of them attached to two ribs, forming a rib cage to protect the vital organs such as the heart and lungs. Because the ribs in turn are connected to the sternum or breastbone, which is relatively rigid, these vertebrae are quite stable and not very mobile.
- c) The Lumbar spine consists of 5 large vertebrae. These are broader and heavier than the other vertebrae since they have to support the large mass of the upper body. These lower vertebrae allow our body to bend forward and backward.
- d) The Sacrum consists of 5 bones that fuse to form a single immobile structure. This broad, triangular structure is attached at the top to the lumbar section and on the side to pelvis, forming the solid bony pelvic ring, which is very strong and relatively immune to injury. This strong pelvic ring (girdle) is designed to transmit the body weight to both lower limbs and also protect the vital organs such as urinary bladder, and the uterus.
- e) The Coccyx is a collection of 4 small bones at the base of the spine and is a vestigial representation of the chain of tail bones of earlier mammals. The coccyx rarely gives as trouble unless of course we fall on it.

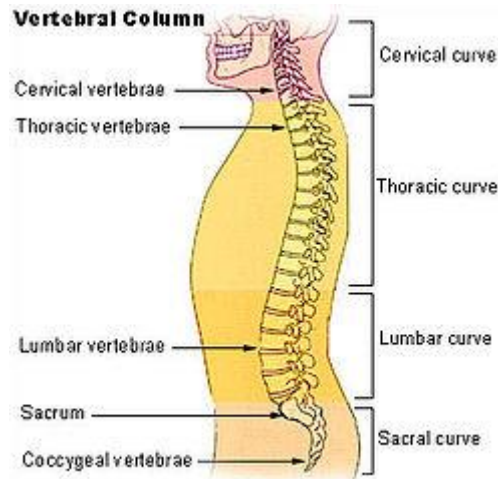


Fig. 2.

1.7.2 FUNCTIONS OF SPINAL COLUMN

Basically the spine has three main functions:

- a) It houses the spinal cord, the vital cable linking the brain to all other parts of the body.
- b) It is the body's principal scaffolding, supporting the skull and anchoring ribs, pelvis and shoulder bones.
- c) It provides broad, bony areas for the attachment of the muscles, tendons and ligaments that permit body movement.

1.7.3 THE VERTEBRA

- Vertebrae has rather complicated bone designed for helping in all these three functions i.e. weight bearing, movement and protection of the delicate spinal cord.
- The Body of the vertebrae is the solid thick and broad part of the bone constituting the front or anterior part of the spine.

- The spinal canal is surrounded by a bony ring consisting of pedicles (two bony stalks arising from behind the body) and laminae (flat strips of bone behind).
- The laminae join posteriorly to form the spinous process of the vertebra.
- There are two lateral projections from the sides called transverse processes.
- These spinous and transverse processes provide sites for attachment of the strong and thick muscles and ligaments of the spine.
- The two lateral intervertebral foramina between two vertebral pedicles provide the passage for the spinal nerves to emerge out of the spinal cord that emerge out of the spinal canal.

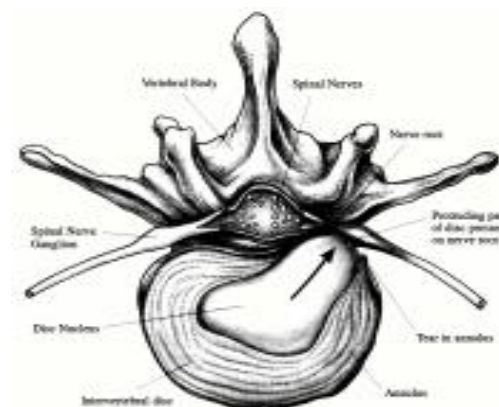


Fig. 3.

1.7.4 INTER-VERTEBRAL DISC

The spine is able to bend and twist because there are flexible cushions or discs between the bodies of the vertebrae. Each disc is a flat structure with a jelly like centre called *Nucleus* and an extremely strong outer covering made of tough fibrous tissue called the *Annulus Fibrosus*. The discs that separate two vertebrae act like shock absorbers for the spine, compressing when weight is put upon it and springing back to their original shape when the weight is taken away. If the spine were without discs, the vertebrae would grind against one another and quickly wear out. Not only do the discs

serve to separate the vertebrae they also act as a hydraulic system, the gelatinous interiors dispersing pressure on the spine evenly in all directions along the back.

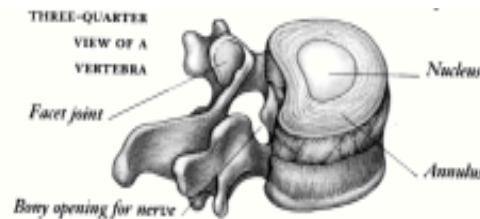


Fig. 4.

1.7.5 INTER VERTEBRAL FACET JOINTS

The vertebrae is also joint to each other by pairs of small synovial joints, which lie at the back of the spine, one on either side. They can be affected by strain or by wear and tear. The bony swelling is due to aging changes (osteophytes) at the margins of facet joints can cause pressure on nerves.

1.7.6 SPINAL CORD

A ‘cable’ of nervous tissue, known as the spinal cord, extends from the brain down the spine inside the canal formed by the vertebrae. The nerve roots divide off from the spinal cord, run off a short distance within the canal itself and then emerge in pairs, one on each side, from the sides of the vertebral column through the intervertebral foramina to supply the trunk, the arms and the legs.

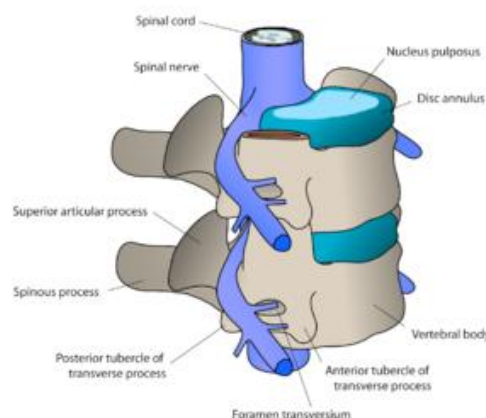


Fig. 5.

The nervous system in some ways resembles a telephone network carrying messages from the brain to various parts of the body and back again. The messages that pass down nerves make muscles contract and so control movements such as walking. Messages traveling up the nerves carry sensations that eventually reach your brain; so you experience sensations such as touch and pain. The white matter of the spinal cord is the main cable of wirings that carry these messages between brain and the body. The small central zone of the gray matter in the spinal cord consists of nerve cells that are involved in this messages transmission as relay stations and reflex centres.

1.7.7 SOFT TISSUES OF THE SPINE

This includes the ligaments, cartilage, tendons and muscles that hold up the spine. The ligaments are tough bands of tissues that connect one to another. The tendons connect muscles to bones; cartilage functions as a shock absorber between the bones in facet joints; and muscles provide the dynamic support for the entire length of the spine.

1.7.8 SPINAL MUSCLES

Back muscles play an important part in backache. They are the controllable elements, responding to the environment and controlled by our conscious thought processes.

All spinal muscles are voluntary muscles that help in bringing about movements of the spine by alternate shortening (during contraction) and lengthening (relaxation). The mind, acting like a computer, controls movements, thinking and formulating messages to the muscles, which carry them out.

The spinal also provides firm dynamic anchorage for the vertebrae.

The long thick spinal muscles help us postural muscles to maintain the erect posture of the body during standing and sitting.

There are four groups of muscles essential for proper functioning of the back.

1. **The Erector Spine:** These back muscles hold the spine erect and provide the posterior support for the back and get the heaviest work out when you push or pull heavy weights, bend over, arch our back, or hold our spine erect.
2. **The Rectus Abdominus:** These abdominal muscles consist of two straps or bands of muscles. They run from the rib cage to the sides and front of the pelvis, providing support to the spine as well as supporting the contents of the abdominal cavity. These get their workouts when we do sit ups from lying down position.
3. **The Lateral muscles:** These muscles lie against the side of the trunk and help control the side ways bending of the spine.
4. **The Hip muscles:** These include the hip flexors, abductors, adductors, and extensors.

1.8 CLASSIFICATION OF BACKACHE

Back ache can be divided *anatomically*:

- Neck pain,
- Upper back pain,
- Lower back pain
- Tailbone pain.

By its **duration**:

- Acute (less then 4 weeks),
- Sub acute (4 - 12 weeks),
- Chronic (greater then 12 weeks).

1.9. LOW BACK ACHE

Low back ache is one of the most common pain disorders today .It is a chronic condition characterized by a persistent dull or sharp pain per the lower back. It may be also associated with burning, stiffness, numbness or tingling with the pain shooting down the buttocks and the legs.



Fig. 6.

1.9.1 CAUSES OF LOW BACK ACHE

1. Common causes:

- Back muscle strain
- Obesity
- Poor posture
- Facet joint arthritis
- Occupational causes.

2. Un common causes

a) Congenital causes:(4 'S')

- Spondylosis
- Spondylolisthesis
- Spinabifida
- Scoliosis.

b) Infective conditions:

- Osteomyelitis
- Tuberculosis
- Brucellosis, etc.

c) Traumatic causes:

- Vertebral body injuries
- Muscle sprain/strain
- Prolapsed disc.

d) Inflammatory causes:

- Rheumatoid arthritis
- Ankylosing spondylitis.

e) Neoplasm:

- Benign-Osteoid Osteoma
- Malignant-Multiple Myeloma, etc.

f) Degenerative conditions:

- Osteoarthritis
- Lumbar spondylosis

1.9.2 SYMPTOMS OF LBA

- Pain across the lower part of the back that sometimes radiates into the buttocks, the back of the thigh or to the groin. The pain is usually worse on movement.
- Limitation in movement of the spine - especially bending forward and leaning back.
- Tense spasm of the muscles surrounding the spine and causing a stiff back.
- With severe pain and spasm, the back may tilt to one side causing a change in posture.
- The pain is sometimes accompanied by a tingling sensation or numbness in the back or buttocks or leg.

1.9.3 DIAGNOSING OF LBA

1. X-ray imaging.
2. Computerized Tomography.(CT-Scan)
3. Magnetic Resonance Imaging.(MRI)
4. Discography.
5. Electromyography.(EMG)
6. Bone scans.
7. Ultrasound imaging.

1.9.4 NON-SURGICAL TREATMENTS OF LBA

- **Bed Rest:**

This will reduce the intra discal pressure and pressure on the nerve roots. Bed rest up to 4 days is allowed. Prolonged bed rest does more harm to the patient, producing weakness, stiffness and pain.

- **Activity modification:**

For some period of time, patients are advised not to lift heavy objects, not to sit in the chair for a long time and not to bend or twist the back.

- **Exercise:**

Low stress aerobic exercise is advised. Walking, cycling and swimming are allowed in the first two weeks. Physiotherapist should be included in the programme for the benefit of patient.

- **Analgesics:**

For acute pain, paracetamol, or other drugs like diclofenac sodium can be used.

- **Patient education:**

Patient should be educated how to modify the daily activities, how to lift weight etc., by charts and diagrams.

- **Steroids:**

In some cases, epidural steroid injections may be helpful.

- **Physical treatment:**

Lumbar traction is of no use. Spa therapy has proven effective in some studies. Relaxing techniques and ultrasound therapy to the back may be helpful to some extent.

1.9.5 SURGICAL TREATMENT OF LBA

Surgery may be indicated when conservative treatment is not effective in reducing pain or when the patient develops progressive and functionally limiting neurologic symptoms such as leg weakness, bladder or bowel incontinence, which can be seen with severe central lumbar disc herniation causing cauda equina syndrome or

spinal abscess¹ Spinal fusion has been shown not to improve outcomes in those with simple chronic low back pain.

1.9.6 DO'S AND DON'TS OF LBA

1. SITTING

A). DO'S

- a) It as little as possible and then only for short periods.
- b) Place a supportive towel roll at the belt line of the back especially when sitting in a car.
- c) When getting up from sitting, keep the normal curves in your back. Move to the front of the seat and stand up by straightening your legs. Avoid bending forward at the waist.
- d) Try to keep the normal curves in your back at all times.

B) DON'TS

- a) Do not sit on a low soft couch with a deep seat. It will force you to sit with your hips lower than your knees and will round your back. You will lose the normal curve in your back.
- b) Do not place your legs straight out in front of you while sitting. (e.g. sitting in the bath tub).

2. STANDING

A) DO'S

- a) If you must stand for a long period of time, keep one leg up on a foot stool.
- b) Adapt work heights.

B) DON'TS

- a) Avoid half bent positions.

3. LIFTING

A). DO'S

- a) Avoid lifting altogether, if you can.
- b) Use the correct lifting technique. Keep your back straight when lifting. Never stoop or bend forward. Stand close to the load, have a firm footing and wide stance. Kneel on one knee, keeping the back straight. Have a secure grip on the load and lift by straightening your knees. Do a steady lift and do not jerk. Shift your feet to turn and do not twist your back.

4. LYING

A) DO'S

- a) Sleep on a good firm surface.
- b) If your bed sags, use slats or plywood supports between the mattress and base to firm it. You also can place the mattress on the floor, a simple but temporary solution.
- c) You may be more comfortable at night when you use a supportive roll. A rolled up towel behind your waist is usually helpful.

B) DON'TS

- a) Do not sleep on your stomach.

5. BENDING FORWARD

A) DO'S

- a) Keep the natural curves of your back by kneeling. (E.g. when making a bed, vacuuming, cleaning the floor or weeding the garden).

6. COUGHING AND SNEEZING

A) DO'S

- a) Bend backwards to increase the curve of your back while you cough or sneeze.

7. DRIVING A CAR

A) DO'S

- a) Drive the car as little as possible. It is better to be a passenger than to drive yourself.
- b) Move the seat forward to the steering wheel. Your seat must be close enough to the wheel to keep the natural curves of your back. If your hips are lower than your knees in this position, raise yourself by sitting on a pillow.

1.9.7 WAYS TO PREVENT THE BACK PROBLEMS

- 1. Lift with muscles on arms and legs. Do not use your back to lift things such as boxes, babies, etc. Avoid putting any pressure on your back. Do not hold heavy things to walk around for too long. Use a dolly or roller instead. Or ask someone with a strong back to help. When pick up things from the floor, use your legs to get up. Try to avoid bending your back.
- 2. Always have back support when sitting, including when riding a car. The back must be in contact with something such as cushion. Avoid sitting for too long without back support. Sitting on the floor or ground is a bad idea. Do not sit on your desk with your upper body leaning forward for too long. Change your position from time to time. During a rough ride on a car, wear seat belt to help "fixing" your body to the seat and back support.

3. Choose the type of chair very carefully. The arm rests must have proper height. Choose the keyboard height carefully to make sure your hands are not blocked to give extra pressure to your back while typing. The seat should not be too big in comparison with your hip. Otherwise, you would sit in front of your seat too long and get your back away from the support.
4. Get up from bed on the side using arms to push your body up instead of using your back to "fold" up facing up.
5. When sleeping, have a second pillow under the knees so that the back is slightly curved to release extra pressure from the flat bed. Try to sleep on the side sometimes with the back "curling up" - without any pressure to the back.
6. Choose bed carefully. Not too firm; not too soft. Some people love water bed. It makes me "sea-sick." What ever you can afford and makes you comfortable.
7. Exercise to strengthen the back muscle. There are specific exercises that are designed to make your back muscle stronger. If the back muscle is stronger, it gives more support to your back.
8. When taking a shower, face away from the faucet so that your back is extended the other way around (bend your back backwards).
9. When sneezing, use your hands to hold the back/sides of your back and lean your head/shoulder toward the back so that the back is extended. The force from the sneezing would not cause sudden pressure to your back.
10. When standing, try to change position frequently. Raise one of your feet slightly from time to time and change the feet. When riding a train, try to get some back

support to cushion the force from the running train. Whenever you can, find a seat to sit down while riding a bus or train. When climbing stairs, use rails and arms to help whenever you can. When in elevator, support your back by leaning against the wall or rail.

11. When pick up light items from the ground, raise one leg to the back to balance your body.
12. Our back bends forward most of the time. Try to bend to the back sometimes to balance it out. Stretch it!
13. Avoid injuries to your back during car accidents and sports such as skiing. Well, sometimes it's out of our control. But while having fun, do not over do it. Avoid twisting your back and waist. I can actually feel something going on inside my back after one round of golfing since golfing involves twisting my waist while swinging and hitting the ball. Always warm up before exercise.
14. Try cold patches immediately after injuries and warm patches during recovery. Do not wear back support too tight for too long. It reduces blood circulation.
15. Different people have different ways to prevent the back problems. Try a few ways yourself to test what work the best for you.
16. If the problem is not that serious, the best cure is to rest! Sleep. Lay down. Do not use your back for an extended period of time. If that still does not help, see a doctor or take some pain medicine. Sitting is better than standing. Lying down is better than sitting.

17. Physical therapy is expensive but effective. You can do it yourself though if you know how. The main "tricks" behind physical therapy are: (a) exercise specific muscle after warming up; (b) take a rest with warm patch after the exercise; (c) repeat of (a) and (b) over and over; (d) educate the "patient" to do these tasks themselves.
18. Find some books to read and do some online searches for tips on back problems. Talk to some one who has this problem before to share ideas and experiences.

“All medicines which enter the circulation, poison the blood in the same manner as do poisons that produce disease”

- Prof.J.M.Smith, M.D.

“A healthy body is impossible without tranquility, cheerfulness and energy of mind.”

- Harry Gaze

1.10 CLINICAL VARIABLES

1.10.1 PAIN

Pain is an unpleasant feeling often caused by intense or damaging stimuli. The International Association for the Study of Pain’s widely used definition states, “pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.”(Harold Merskey 1979)

1.10.2 CADENCE

“The number of steps taken by a patient per unit time. The only equipment necessary is a stopwatch, paper and pencil”.

$$\text{Cadence} = \frac{\text{Number of steps}}{\text{Time}}$$

1.10.3 RANGE OF MOTION

“Range of motion refers to the distance and direction a joint can move to its full potential. Each specific joint has a normal range of motion that is expressed in degrees after being measured with a Goniometer” (i.e., an instrument that measures angles from axis of the joint).

1.11 PHYSIOLOGICAL VARIABLES

Yoga has become increasingly popular in Western cultures as a means of exercise and fitness training; however, it is still depicted as trendy as evidenced by an April 2001 Time magazine cover story on "The Power of Yoga." There is a need to have yoga better recognized by the health care community as a complement to conventional medical care. Over the last 10 years, a growing number of research studies have shown that the practice of Hatha Yoga can improve strength and flexibility, and may help control such physiological variables as blood pressure, respiration and resting pulse rate , and metabolic rate to improve overall exercise capacity. **(James A. Raub, MS, 2004)**

1.11.1 BLOOD PRESSURE

Hypertension happens when the pressure in your system gets high enough leading to risks in your system. It is also commonly known as high blood pressure, which refers to the amount of pressure in your arteries. In diagnosing hypertension, several readings must be taken. If the rate of blood pressure reaches to as high as 140/90, then hypertension is present. **(Chobanian AV, et al. 2003).**

In order to manage hypertension, lifestyle management, one of which is Yoga Lifestyle, helps treat and prevent hypertension through mind and body activities. Yoga helps to keep the heart healthy by lowering the blood pressure. Those who have already heart problems can remain healthy by meditation practice. Scientists of yoga discovered

why people who practice yoga daily had significantly lower blood pressure than those who did not. High Blood pressure is the major cause for heart disease. Yoga keeps the blood vessels open & thus lowering the blood pressure. Indian Yoga Gurus also say that long term meditation practice generally lower the blood pressure & keeps the constant mood swings. **(Dr. Arumughan Riaz, 2006)**

1.11.2 RESTING PULSE RATE

The number of heart beats per unit time, usually per minute. The resting pulse rate is based on the number of contractions of the ventricles (the lower chambers of the heart). The resting pulse rate may be too fast (tachycardia) or too slow (bradycardia). The pulse is bulge of an artery from the wave of blood coursing through the blood vessel as a result of the heart beat. The pulse is often taken at the wrist to estimate the resting pulse rate. **(Karvonen MJ, et.al 1957).**

1.11.3 RESPIRATORY RATE

The number of breaths per minute or, more formally, the number of movements indicative of inspiration and expiration per unit time. In practice, the respiratory rate is usually determined by counting the number of times the chest rises or falls per minute. By whatever means, the aim is to determine if the respirations are normal, abnormally fast (tachypnea), abnormally slow (bradypnea), or nonexistent (apnea) **(G J Tortora & N P Anagnostakos, 1990).**

1.12 PSYCHOLOGICAL VARIABLES

Yoga induces a "relaxation response" associated with reduced nervous system activity and a feeling of well-being probably due to an increase in antioxidants and lower levels of the stress hormone cortisol; Yoga not only helps in prevention of lifestyle diseases, but can also be "a powerful adjunct therapy when these diseases arise,"

Yoga is a form of exercise and it's this form of activity provides great benefits psychologically. In studies done in Finland in 2000, participants were asked to partake in exercises. Based on this study, scientists discovered a connection between mood and recreational exercise. Those who participated in exercise at least two times a week had some positive effects on mood. There were fewer signs of depression and anger found among these individuals. Moreover, the ones who participated in these exercises more than twice a week were prone to be sociable, allowing one to be less stressful.

1.12.1 STRESS

The modern man suffers more psychological stress than the physical stress. Human is trying to live a successful life as per the expectation and norms of the society and is continually challenged with rapidly accumulating stresses. In this fast moving social set up, with high standard of living and innumerable changes the individual have no time to look back and think about what is happening to his body and mind. This accumulated stress for prolonged period leads him to the so called stress induced disorders, like heart attacks, high blood pressure, Diabetes, Asthma, Back ache and other psychological problems.

A change in attitude and life style is necessary to help the individual to come out these health hazards and to cope with the future. Traditional yoga philosophy, regards human being an individual entity. The root cause of ailment of a stress, through the various therapeutical techniques of yoga one can pluck out this cause and can provide health and harmony. **(Davidson. G.C and Neal J.M 1990).**

Most types of insomnia are stress-related, so a gentle yoga practice that calms the nervous system and reduces stress levels will naturally relieve insomnia as well. The calming effects of a yoga help people fall asleep sooner and gives a more restful sleep.

Many yoga postures increase the blood circulation to the brain, including the sleep center of the brain, which helps normalize the sleep cycle and provides natural relief for insomnia.

Stress is the most prominent causes of mental fatigue. It consumes energy, breeds negativity and depression. Yoga believes that a healthy mind is essential for a healthy life. Regular yoga helps to clear the mind of negativity and clutter. Through breathing techniques and meditation, yoga teaches your body to breathe fully. This increases the supply of oxygen to the body which in turn helps reduce stress, increase energy flow and ensure mental clarity. **(Patricia 2008).**

1.12.2 ANXIETY

While doing any job when one suspects about the proportion of possibility of success is known as anxiety. Anxiety is psychological factor that differs from arousal. It encompasses some degree of activation and an unpleasant emotional state. This form anxiety is used to describe the combination of intensity of behavior and directional effect or emotion.

Anxiety plays an important role in the acquisition of motor skills as well as in athletic performance. Anxiety can either enhance or inhabit performance whether its effect is positive or negative depends on how an individual athlete perceives the situation.

People with low trait level have been known to perform better in selected motor skills than those with high or trait levels. There is also positive relationship between participants in athletic competition.

A moderate level of anxiety seems best for the acquisition and performance of motor skills levels of anxiety either too high or too low tend to inhibit learning and performance (Lewellyn and Blucker, 1974) .

1.12.3 SELF CONFIDENCE

Psychologists define self-confidence as the belief that one can successfully perform activity or desired behavior. The desired activity or behavior might be dancing for two hours, staying on an exercise regimen, recovering from a knee injury, serving an ace, or hitting a home run. But the common factor is that one believes that he will get the job done.

It is important to make a final comment about defining self-confidence. Specifically, some evolving and recent research has revealed that like many other current personality constructs, self confidence may be multi dimensional, consisting of several aspects. Specifically, there appear to be several aspects, there appears to be several types of self-confidence within sport including the following:

- Confidence about one's ability to execute physical skill
- Confidence is about one's ability to utilize psychological skill (e.g. imagery, self-talk).
- Confidence in one's level of physical fitness and training status
- Confidence in one's learning potential or ability to improve one's skill.

(Robert S.Weinbergh and Deniel Gould, 1995)

There are number of researches that have found that yogic practices improve physical, physiological, biomechanical, hematological and psychological variables among different population.

1.13 OBJECTIVES OF THE STUDY

1. To treat low back ache with yogic practices, Therapeutic exercise practices and combined practices.
2. To study which of the above method of treatment is best to cure the low back ache.
3. To promote inner health and harmony.
4. To explore whether yogic practices, Therapeutic exercise practices and combined practices shows any changes on selected physiological variables among low back ache .
5. To examine the effect of yogic practices, Therapeutic exercise practices and combined practices on selected psychological variables among low back ache.
6. To find out the impact of yogic practices, Therapeutic exercise practices and combined practices on selected clinical variables among low back ache.
7. To analyze the efficacy of yogic practices, Therapeutic exercise practices and combined practices on selected clinical, physiological and psychological variables among low back ache.

1.14 REASONS FOR THE SELECTION OF THE TOPIC

In the modern days, people are living in sedentary way of life. As a result they are prone to various disorders like low back ache. So the researcher liked to create awareness among the people with the low back ache . By using yogic practices, Therapeutic exercise practices and combined practices as a tool for treated above disorders.

1.15 REASONS FOR THE SELECTION OF VARIABLES

The variables like pain, muscle power and disability are common in low back ache . They affect the activities of the daily living (ADL) of the patient. So the above mentioned clinical variables like pain, cadence and range of motion were taken into account. And also physiological variables like heart rate, systolic and diastolic blood pressure and respiratory rate and psychological variables like stress, anxiety and self confidence plays a vital role in determining the health of the individuals. The above clinical, physiological and psychological variables are considered for the study.

1.16 STATEMENT OF THE PROBLEM

The purpose of study was to effect of yogic practices, Therapeutic exercise practices and combined practices on selected clinical, physiological and psychological variables among low back ache men.

1.17 HYPOTHESIS

1. It was hypothesized that there would be significant differences in yogic practices than the control group on selected clinical, physiological and psychological variables among low backache men.
2. It was hypothesized that there would be significant differences in Therapeutic exercise practices than control group on selected clinical, physiological and psychological variables among low backache men.
3. It was hypothesized that there would be significant differences in combined (yogic practices & therapeutic exercises) than control group on selected clinical, physiological and psychological variables among low backache men.

4. It was hypothesized that there would be significant differences between yogic practices, Therapeutic exercise practices and combined (yogic practices & therapeutic exercises) on selected clinical, physiological and psychological variables among low backache men.

1.18 SIGNIFICANCE OF THE STUDY

1. The findings of the study would help to explore the status of the yogic practices, Therapeutic exercise practices and combined (yogic practices & therapeutic exercises) among low backache men.
2. This study would bring out the effect of yogic practices, Therapeutic exercise practices and combined (yogic practices & therapeutic exercises) among Low backache men.
3. This study will describe the changes in physiological, biochemical and psychological variables due to yogic practices, Therapeutic exercise practices and combined (yogic practices & therapeutic exercises) among low backache men.
4. This study would give an idea in maintaining the normal level of heart rate, systolic blood pressure and diastolic blood pressure and respiratory rate.
5. This study helps for the low backache men in maintaining their mental, emotional stability and self confidence and to reducing stress and depression.
6. This study would give an idea in pain, cadence and range of motion.
7. The findings of the study would help to adopt the suitable training programme to maintain the good health for low backache men .
8. The findings of the study would be helpful for the further research studies, also helpful for the academy of low backache men .

1.19 DELIMITATIONS

The following delimitations were taken into consideration in the interpretation of results:

1. The study was confined the males only.
2. The study was conducted on the males having low back ache only
3. The age limit of the subjects was ranging from 30 to 40 years only.
4. A total number of 60 low back ache , 15 for control group, 15 for yogic practices group, 15 for Therapeutic exercise practices and 15 for combined (yogic practices & therapeutic exercises) were taken for the study.
5. The subjects were selected from magesh, Rajesh & physiotherapy clinic, annanagar, Chennai city only.
6. The study was conducted on dependent variables of resting pulse rate, systolic blood pressure, respiratory rate, pain, cadence, range of motion, stress, anxiety and self confidence only.

1.20 LIMITATIONS

1. The other ways of treatment underwent by the patients were not taken into account.
2. External factors like diet, habits, life styles, body structure, socio-economic status, motivation and other environmental conditions were not taken into consideration.

1.21 MEANING AND DEFINITION OF THE TERMS

1.21.1 YOGIC PRACTICES

“Yogic practice is a system or a method of doing or achieving something is based on logic and rational consideration, it qualifies to be scientific.”

1.21.2 LOW BACK PAIN

Low Back ache is one of the most common pain disorders today .It is a chronic condition characterized by a persistent dull or sharp pain per the lower back. It may be also associated with burning, stiffness, numbness or tingling with the pain shooting down the buttocks and the legs.

1.21.3 PAIN

Pain is an unpleasant feeling often caused by intense or damaging stimuli. The International Association for the Study of Pain’s widely used definition states, “pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.”(Harold Merskey 1979).

1.21.4 CADENCE

“The number of steps taken by a patient per unit time. The only equipment necessary is a stopwatch, paper and pencil”.

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“Range of motion refers to the distance and direction a joint can move to its full potential. Each specific joint has a normal range of motion that is expressed in degrees after being measured with a Goniometer” (i.e., an instrument that measures angles from axis of the joint).

1.21.6 BLOOD PRESSURE

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several readings must be taken. If the rate of blood pressure reaches to as high as 140/90, then hypertension is present. **(Chobanian AV, et al. 2003).**

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1.21.9 STRESS

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effect is positive or negative depends on how an individual athlete perceives the situation. A moderate level of anxiety seems best for the acquisition and performance of motor skills levels of anxiety either too high or too low tend to inhibit learning and performance. (Lewellyn and Blucker, 1974) .

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CHAPTER - II

REVIEW OF RELATED LITERATURE

A study of relevant literature is essential to get a full picture of what has been done and said with regard to the problem under study. Aggarwal quotes that in the words of Walter R. Brog *“The literature in any field form the foundation upon which all future work will be built”*.

The project worker traced out different types of research works like abstracts from dissertations, thesis, journals, magazines and relevant books on yoga, Therapeutic exercise practices and orthopedic.

A series of relevant studies related to the problem under study and views expressed by various personalities have been presented in this chapter.

2.1 STUDIES ON LOW BACK ACHE

Weiss HR and Werkmann (1998) Conducted study on treatment of chronic low back ache in a patients with spinal deformities using a sagittal realignment brace. In this study 67 patients (58 female and 9 males) with chronic low back ache (> 24 months) are taken and give sagittal realignment brace, for twenty hours per day for 24 months. At the mid (18 months) they measure the pain by Roland and Morris scale. As a result the pain reduced and deformity of scoliosis, kyphosis and Lordosis all reduced and improve the physical function and Activities of Daily Living(ADL).

Andrade SC and Araujo AG (2004) conducted the study on Back School for patients with non-specific chronic low back ache at Universidad Federal do Riogrande do Norte (UFRN) Natal, Brazil. They conducted the study on seventy patients were

randomized into two groups, experimental group (34 patients) and control group (36 patients) with 16 week intervention. After 16 week intervention, the pain intensity (Visual Numeric Analogue Scale), functional disability (Roland- Morris Disability Questionnaire) and spinal mobility (Schober index) all are analyzed. As a result, improve spinal mobility and reduce the pain intensity and functional disability.

Gautschi OP, Cadosch D and Bauer S conducted study on chronic low back ache at Klink fur Neuro Chirurgie, kantonsspial St, University of Western Australia ,Australia. In this study upto 10% of patients with low back ache develop chronic low back ache which leads to alleviation of the performance and increased inactivity beginning of a vicious circle. A multimodel treatment concept including Physio- and Psycho Therapy supported by a targeted medicameatousTheraphy, which normally improves physical functions and activities a significant discomfort reduction.

Fishbain DA and Luis JE conducted the study on Are Chronic low back ache patients who smokes at greater risk for suicide Ideation? at department of Psychiatry, University of Miami, USA. In this study they select chronic low back ache with smoker (N=81) and CLBP with non smokers (N=140) and using evaluation instruments are Beck Depression Inventory. (BDI) and the Coping Strategies Questionnaire (CSQ). In this study 78 patients of chronic low back ache smokers are more prone to suicides than the non smoker of CLBP

Engers A and Jellema P (2003) conducted study on individual patient education for low back ache at Radboud University, Nijmegen Medical Centre, and Netherland. In the study ,they analysis the patient education for sub acute low back ache patients they found the results of oral education with medical intervention is give better results than medical intervention alone.

2.2 STUDIES ON LOW BACK ACHE WITH YOGA

Groessl E J and Weingart KR (2002) conducted the study on yoga for Veterans with chronic low back ache at Health Services Research and Development, USA. They select the subjects of Veterans Administration patients and apply yoga programs for ten weeks. After completions of yoga programs take –t-test as a result the outcomes are improved. To assess pain, disability by means of Mc Gill Pain Questionnaire and Roland scale give better improvement.

Sherman K J and Cherkin DC (2003) conducted the study on comparing yoga, exercise and a self –care book for chronic low back ache at Group co-operative and university of Washington, USA. They select the 101 subjects of chronic low back ache and apply 12 weeks of yoga program for one group and 12 weeks exercise for one group. After that the pain and disability are assessed by Bothersomeness and Roland (11 point scale) disability scale (24 point scale). As a result the yoga was more effective than a self-care book and exercise for chronic low back pain.

Morone NE and Greco C M (2002) conducted the study on the mindfulness meditation for the treatment of chronic low back ache in older adults a randomized controlled pilot study at Department of medicine, University of Pittsburg, USA. They select the 37 subjects community- dwelling older adults aged adults aged 65 years and give 8 week mindfulness- based meditation program, as a results improvement in pain acceptance and physical functions.

Nagendra H R conducted the study on effect of short term intensive yoga program on pain, cadence, functional disability and spinal flexibility in chronic low back ache through randomized controlled study. They conducted the study on 80 subjects with chronic low back pain. They were divided into two groups, group one, short term 1 week

intensive residential yoga program and group two, physical exercises under a trained physiatrist was given to them. Pain related outcomes were assessed by OSWESTRY DISABILITY INDEX (ODI) and by spinal flexibility which was assessed using goniometer at pre and post intervention. Data were analyzed using repeated measures analysis of variance (RMANOVA). Data conformed to a Gaussian distribution. There was a significant reduction in ODI scores in the yoga group compared to the control group ($p = 0.01$; effect size 1.264). Spinal flexibility measures improved significantly in both groups but the yoga group had greater improvement as compared to controls on spinal flexion ($p = 0.008$; effect size 0.146), spinal extension ($p = 0.002$; effect size 0.251), right lateral flexion ($p = 0.059$; effect size 0.006); and left lateral flexion ($p = 0.006$; effect size 0.171). As a conclusion Seven (7) days of a residential intensive yoga-based lifestyle program reduced pain-related disability and improved spinal flexibility in patients with CLBP better than a physical exercise regimen.

Morone NE and Lynch CS (2004) conducted the study on the effects of mindfulness meditation on older adults with chronic pain at Department of medicine, University of Pittsburg, USA. They select the 27 adults (65 years) of mindfulness meditation program. As a result reduce pain, improved attention, better sleep, enhanced well-being and improved the quality of life.

Mehling W E and Hamel K A (2006) conducted the study on Randomized, controlled trial of breath therapy with chronic low back ache at University of California, USA. They select 36 subjects and give breath therapy for 6 to 8 weeks (12 sessions). As a results improve the quality of life, reduced the pain by pain accepting the pain and improve the physical ability.

Williams KA and Petronis J (2005) conducted the study on Effect of Iyengar yoga therapy for chronic low back ache at Department of Community Medicine, West Virginia University, school of Medicine, USA. They select the 60 subjects of chronic low back ache and apply 16 weeks of Iyengar yoga therapy. As a results reductions in pain intensity (64%), functional disability (77%).

Galantino M L and Bzdewka T M (2001) conducted the study on the impact of modified Hatha yoga on chronic low back ache at program in Physical therapy, Richard Stockton college of New Jersy, USA. They select 22 subjects of chronic low back ache and divided into 2 groups, one group for practice of Hatha yoga and one group of controlled group for one hour per day for twice a week for 6 weeks. After 6 week of program, the pain, disability all are assessed by Oswestry Disability Index (ODI) and take forward reach (FR) and Sit and reach (SR) tests. As a result, improved physical functions and reduce pain.

Rasmussen- Barr E and Ang B (1999) conducted the study on Graded exercises for recurrent low back ache through randomized, controlled trial at Department of Neurology, Division of Physiotherapy, Karolinska Institute, and Stockholm, Sweden. They conducted the study on 71 subjects with (36 men and 35 women) recurrent low back ache with 6, 12, 36 month follow ups. As a result these graded exercises improve the Rating of physical health and reduced the low back pain.

Andrade SC and Araujo AG (2003) conducted the study on Back School for patients with non- specific chronic low back ache at Universidad Federal do Rio Grande do Norte (UFRN), Natal, Brazil. They conducted the study on seventy patients were randomized into two groups; experimental group (34 patients) and controlled group (36 patients) with 16 weeks intervention. After 16 week intervention, the pain intensity

(Visual numeric Analogue Scale), functional disability (Roland- Morris Disability Questionnaire) and Spinal mobility (Schober index) all are analyzed. As a result, improve spinal mobility and reduce pain intensity and functional disability.

Helmhout PH and Stall JB (2001) conducted the study on Exercise therapy and low back ache at Training Medicine and Training Physiology team, Occupational Health and Safety, Netherland. They select the group in randomized controlled study and apply exercises therapy for 6 weeks. As a results the disability, pain all are reduced and improve the physical activity.

Marshall PW and Murphy BA (2003) conducted the study on muscle activation changes after exercise rehabilitation for chronic low back ache at Department of Sports and Exercise sciences, University of Auckland, New Zealand. They select the 112 subjects and give 12 weeks of exercise therapy, after that they get feed back by getting 2 electromyographic measures are flexion relaxation responses and feed forward activation of the deep abdominal muscles. As a result, it shows greater improvement in physical activity and reduced the pain.

Weiner DK and Perera S (1998) conducted the study on Efficacy of Percutaneous electrical nerve stimulation and Therapeutic exercise practices for older adults with chronic low back ache at Department of Medicine, University of Pittsburgh, USA. They select 200 subjects (men and women) randomizly and give one group for percutaneous electrical nerve stimulation (PENS) and exercise, and one group for controlled in manner for 6 months. After completion of 6 months treatment, pain and disability are measured by Mc Gill Pain Questionnaire and Roland Scale. As a result the pain reduced and improves physical function.

Henchoz Y and Kai-Lik So A (2002) conducted the study on Exercise and non-specific low back ache at Institute des Sciences du sport de education physique, universite de Lausanne, Switzerland. They select non-specific low back ache group from randomized study and apply exercises. As a result, the pain and disability are diminished and improve physical function.

Macedo LG and MC Auley JH (2004) conducted the study on Motor control exercise for persistent, non-specific low back ache at the George Institute for International Health, the University of Sidney, Australia. They selected 40 subjects and give Motor control exercise and another 40 subjects as a control group. End of the 6 week, the pain, disability are reduced and improve the quality of life in Motor control exercise group, compare to control group.

Hollinghurst S and Sharp D (2003) conducted the study on Randomized controlled trial of Alexander technique lessons, exercises, and massage for chronic and recurrent back ache in Academic Unit of Primary Health Care, University of Bristol. They selected the 579 subjects in which they are control group, massage group, Alexander technique group and exercise group through Randomized controlled trial. 24 lessons of Alexander technique and twelve weeks of exercise, massage to the subjects, leads to improve the full Range of Motion (ROM) of spine and reduce pain.

Durall CJ and Undermann BE (2001) conducted the study on the effect of pre season trunk muscle training on low back ache occurrence in women collegiate gymnasts at department of physical therapy university of Wisconsin-la crosses ,USA. They selected 15 colligate women gymnasts for training group of 15 non athlete college women control group and conducted the pretest trunk muscle endurance test. They give 10 weeks of

training in twice a week, in which trunk muscle training given. As a result improve trunk muscle endurance is proved by taken post test at end of the 10th week.

Macedo LG, Mcauley JH (2004), conducted the study on motor control exercise for persistent, non specific low back ache at the George Institute for International Health, the University of Sidney at Australia. They selected the 40 students and give motor control exercises and another 40 subjects as a control group, End of the 6 week, the pain disability are reduced and improve the quality of life in motor control exercise group.

2.3 STUDIES ON CLINICAL VARIABLES

Andrade and Araujo (2003) conducted the study on back school for patients with non- specific chronic low back ache at Universidad Federal do Rio Grande do Norte (UFRN), Natal, Brazil. They conducted the study on seventy patients were randomized into two groups; experimental group (34 patients) and controlled group (36 patients) with 16 weeks intervention. After 16 week intervention, the pain intensity (Visual numeric Analogue Scale), functional disability (Roland- Morris Disability Questionnaire) and Spinal mobility (Schober index) all are analyzed. As a result, improve spinal mobility and reduce pain intensity and functional disability.

Andrade and Araujo (2004) conducted the study on back School for patients with non-specific chronic low back ache at Universidad Federal do Riogrande do Norte (UFRN) Natal, Brazil. They conducted the study on seventy patients were randomized into two groups, experimental group (34 patients) and control group (36 patients) with 16 week intervention. After 16 week intervention, the pain intensity (Visual Numeric Analogue Scale), functional disability (Roland- Morris Disability Questionnaire) and spinal mobility (Schober index) all are analyzed. As a result, improve spinal mobility and reduce the pain intensity and functional disability.

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Engers and Jellema (2003) conducted study on individual patient education for low back ache at Radboud University, Nijmegen Medical Centre, and Netherland. In the study ,they analysis the patient education for sub acute low back ache patients they found the results of oral education with medical intervention is give better results than medical intervention alone.

Fishbain and Leuis (1999) conducted the study on are chronic low back ache patients who smokes at greater risk for suicide ideation? At department of Psychiatry, University of Miami, USA. In this study they select chronic low back ache with smoker (N=81) and CLBP with non smokers (N=140) and using evaluation instruments are Beck Depression Inventory. (BDI) and the Coping Strategies Questionnaire (CSQ). In this study 78 patients of chronic low back ache smokers are more prone to suicides than the non smoker of CLBP.

Gautschi, Cadosch and Bauer (2001) conducted study on chronic low back ache at Klink fur Neuro Chirurgie, kantonsspial St,University of Western Australia ,Australia. In this study upto 10% of patients with low back ache develop chronic low back ache which leads to alleviation of the performance and increased inactivity beginning of a vicious circle. A multimodel treatment concept including Physio- and

Psycho Therapy supported by a targeted medicameatous Therapy, which normally improves physical functions and activities a significant discomfort reduction.

Helmhout and Stall (2001) conducted the study on exercise therapy and low back ache at training medicine and training physiology team, occupational health and safety, Netherland. They select the group in randomized controlled study and apply exercises therapy for 6 weeks. As a results the disability, pain all are reduced and improve the physical activity.

Henchoz and Kai-Lik So (2002) conducted the study on exercise and non-specific low back ache at Institute des Sciences du sport de education physique, universite de Lausanne, Switzerland. They select non-specific low back ache group from randomized study and apply exercises. As a result, the pain and disability are diminished and improve physical function.

Hollinghurst and Sharp (2003) conducted the study on randomized controlled trial of Alexander technique lessons, exercises, and massage for chronic and recurrent back ache in Academic Unit of Primary Health Care, University of Bristol. They selected the 579 subjects in which they are control group, massage group, Alexander technique group and exercise group through Randomized controlled trial. 24 lessons of Alexander technique and twelve weeks of exercise, massage to the subjects, leads to improve the full Range of Motion (ROM) of spine and reduce pain.

Ling and Shang (2007) conducted the study on relationship between the level of MCP-1 expression in sera of RA patients and ILD at Department of Rheumatology and Immunology, the First Affiliated Hospital, China Medical University, China. They selected 60 patients with RA were divided into two groups: 30 cases with simple RA group and 30 cases with ILD secondary from RA (RA+ILD group). The control group

included 20 healthy cases. Enzyme linked immunosorbent assay (ELISA) was used to determine the serum expression of MCP-1 in patients healthy controls. The differences of MCP-1 level and other laboratory indexes (IgG, IgA, IgM, alpha2-G, gamma-G, RF, ESR, CRP, and the number of arthrocele) in different groups were compared with software spss13.0. The expression of MCP-1 in simple RA patients was significantly higher than that in the control group ($P > 0.05$) and significantly lower than that in the RA+ILD group ($P > 0.01$). The level of MCP-1 in serum of RA patients was positively correlated with IgG, IgM, and gamma-G. As a result MCP-1 plays an important role in the pathogenesis of RA and may contribute to the promotion of lung fibrosis in ILD secondary from RA.

Macedo and Auley (2004) conducted the study on motor control exercise for persistent, non-specific low back ache at the George Institute for International Health, the University of Sidney, Australia. They selected 40 subjects and give Motor control exercise and another 40 subjects as a control group. End of the 6 week, the pain, disability are reduced and improve the quality of life in Motor control exercise group, compare to control group.

Marshall and Murphy (2003) conducted the study on muscle activation changes after exercise rehabilitation for chronic low back ache at Department of Sports and Exercise sciences, University of Auckland, New Zealand. They select the 112 subjects and give 12 weeks of exercise therapy, after that they get feed back by getting 2 electromyographic measures are flexion relaxation responses and feed forward activation of the deep abdominal muscles. As a result, it shows greater improvement in physical activity and reduced the pain.

Rasmussen - Barr and Ang (1999) conducted the study on graded exercises for recurrent low back ache through randomized, controlled trial at Department of Neurology, Division of Physiotherapy, Karolinska Institute, and Stockholm, Sweden. They conducted the study on 71 subjects with (36 men and 35 women) recurrent low back ache with 6, 12, 36 month follow ups. As a result these graded exercises improve the Rating of physical health and reduced the low back pain.

Saad and Ashcroft (2009) conducted the study on efficacy and safety of anti-TNF therapies in psoriatic arthritis at School of Pharmacy and Pharmaceutical Sciences and Arthritis Research Campaign (ARC) Epidemiology Unit, University of Manchester, Manchester, UK. The study included PsA patients (n = 596) registered with the British Society for Rheumatology Biologics Register (BSRBR). Response was assessed using the European League against Rheumatism (EULAR) improvement criteria. Univariate and multivariate logistic regression models were developed to examine factors associated with EULAR response and disease remission using a range of covariates. Poisson regression was used to calculate incidence rate ratios (IRRs) for serious adverse events (SAEs) vs seronegative RA controls receiving DMARDs, adjusting for age, sex and baseline co-morbidity. At baseline, the mean (s.d.) DAS-28 was 6.4 (5.6). Of the patients, 70.3% were EULAR responders at 12 months. At 6 months, older patients [adjusted odds ratio (OR) 0.97 per year; 95% CI 0.95, 0.99], females (adjusted OR 0.51; 95% CI 0.34, 0.78) and patients on corticosteroids (adjusted OR 0.45; 95% CI 0.28, 0.72) were less likely to achieve a EULAR response. Over 1776.2 person-years of follow-up (median 3.07 per person), the IRR of SAEs compared with controls was not increased (0.9; 95% CI 0.8, 1.3). As a result Anti-TNF therapies have a good response rate in PsA, and have an adverse event profile similar to that seen in a control cohort of patients with seronegative arthritis receiving DMARD therapy.

Van der Leeden and Steultjens (2007) conducted the study on forefoot disease activity in rheumatoid arthritis patients in remission a Sciences and Arthritis Research Campaign (ARC) Epidemiology Unit, University of Manchester, Manchester, UK. They selected total of 848 patients with recent-onset RA were included from 1995 through 2007. The DAS28 and pain and swelling of the metatarsophalangeal (MTP) joints were assessed annually. The data were analyzed using descriptive techniques. On average 35% of the patients fulfilled the remission criterion of DAS28 < 2.6 during the first eight years of RA. On average 29% of these patients had at least one painful MTP joint, and on average 31% had at least one swollen MTP joint during follow-up. Forty percent, on average, had at least one involved MTP joint (pain and/or swelling). As a result Painful and/or swollen MTP joints were detected in a substantial proportion of patients classified as being in remission. Therefore, examination of the foot joints - irrespective of the patient's state of remission - seems indicated in order to provide optimal foot care.

Weiner and Perera (1998) conducted the study on efficacy of percutaneous electrical nerve stimulation and Therapeutic exercise practices for older adults with chronic low back ache at Department of Medicine, University of Pittsburgh, USA. They select 200 subjects (men and women) randomizly and give one group for percutaneous electrical nerve stimulation (PENS) and exercise, and one group for controlled in manner for 6 months. After completion of 6 months treatment, pain, range of motion and disability are measured by Mc Gill Pain Questionnaire and Roland Scale. As a result the pain reduced and improves physical function.

2.4 STUDIES ON PHYSIOLOGICAL VARIABLES

Many research studies bring out the way yoga influences physiological functions and its' usefulness in disease. In recent years there has been considerable interest in scientific research on yoga in India and in the West. (Kothari et al. 1973)

Hypertension is a major chronic lifestyle disease. Several non-pharmacological interventions are effective in bringing down the blood pressure (BP).

Sivasankaran S, et.al, (2008) examined the effects of yoga and meditation on hemodynamic and laboratory parameters as well as on endothelial function in a 6-week pilot study. Systolic and diastolic blood pressures, resting pulse rate, body mass index (BMI), fasting glucose, lipids, hs C-reactive protein (CRP), and endothelial function (as assessed by brachial artery reactivity) were all studied at baseline and after 6 weeks of yoga practice. A course in yoga and meditation was given to the subjects for 1.5 h three times weekly for 6 weeks and subjects were instructed to continue their efforts at home. This prospective cohort study included 33 subjects (mean age 55 +/- 11 years) both with (30%) and without (70%) established coronary artery disease (CAD). There were significant reductions in blood pressure, resting pulse rate, and BMI in the total cohort with yoga. None of the laboratory parameters changed significantly with yoga. For the total cohort there was no significant improvement in endothelial-dependent vasodilatation with yoga training and meditation compared with baseline (16.7% relative improvement from 7.2-8.4%; $p = 0.3$). In the group with CAD, endothelial-dependent vasodilatation improved 69% with yoga training (6.38-10.78%; $p = 0.09$). The conclusion of the study was yoga and meditation appears to improve endothelial function in subjects with CAD.

Saptharishi L, et.al, (2009) conducted the study was Community-based Randomized Controlled Trial of Non-pharmacological Interventions in Prevention and Control of Hypertension among Young Adults. The main objectives of the study were to measure the efficacy of physical exercise, reduction in salt intake, and yoga, in lowering BP among young (20-25) pre-hypertensive and hypertensive, and to compare their relative efficacies. The setting and design of the study was done in the urban service

area of JIPMER. The participants were randomized into one control and three interventional groups. The materials and method of study was a total of 113 subjects: 30, 28, 28 and 27 in four groups respectively participated for eight weeks: control (I), physical exercise (II) - brisk walking for 50-60 minutes, four days/week, salt intake reduction (III) - to at least half of their previous intake, and practice of yoga (IV) - for 30-45 minutes/day on at least five days/week. The statistical analysis used to Efficacy was assessed using paired t test and ANOVA with Games Howell post hoc test. An intention to treat analysis was also performed. The result of the study was a total of 102 participants (29, 27, 25 and 21 in groups I, II, III and IV) completed the study. All three intervention groups showed a significant reduction in BP (SBP/DBP: 5.3/6.0 in group II, 2.6/3.7 in III, and 2.0/2.6 mm Hg in IV respectively). There was no significant change (SBP/DBP: 0.2/0.5 mmHg) of BP in control group (I). Physical exercise was most effective (considered individually); salt intake reduction and yoga were also effective. The conclusion of the study was Physical exercise, salt intake reduction, and yoga is effective non-pharmacological interventions in significantly reducing BP among young hypertensive and pre-hypertensive.

Barnes, et.al, (2004) investigated the effects of meditation on blood pressure and resting pulse rate in youth. They have taken the subjects were 73 middle school students (age 12.3 +/- 0.6 years) were randomly assigned to either a meditation group (N= 34) or a health education control group (N = 39) group. The meditation group meditated for 10 minutes at school and after school (at home) every day for 3 months. Blood pressure and resting pulse rate were measured pre-test (pre-meditation training) and post-test (after the 3 months). Researchers took both resting (seated) and ambulatory (walking around in everyday life) measures of blood pressure and resting pulse rate. Resting blood pressure and resting pulse rate were measured on three

consecutive school days (to increase reliability of the measurements). Ambulatory measurements were recorded over 24-hour periods at pretest and posttest every 20 minutes during self-reported normal waking hours and every 30 minutes during self-reported normal sleep hours. Compared to students in the control group, students in the meditation group showed a significant decrease in resting blood pressure, day time ambulatory blood pressure after school, and daytime ambulatory resting pulse rate after school. The conclusions of the study were the potential beneficial impact of meditation on blood pressure and resting pulse rate in the natural environment in healthy normotensive youth.

Kim E. Innes, et.al, (2004) conducted the study about the effects of yoga, a promising mind-body therapy, on specific anthropometric and physiologic indices of cardiovascular disease (CVD) risk and on related clinical endpoints. Identified 70 eligible studies, including 1 observational study, 26 uncontrolled clinical trials, 21 nonrandomized controlled clinical trials, and 22 RCTs. The results of the studies were, the beneficial changes overall in several IRS-related indices of CVD risk, including glucose tolerance and insulin sensitivity, lipid profiles, anthropometric characteristics, blood pressure, oxidative stress, coagulation profiles, sympathetic activation, and cardiovagal function, as well as improvement in several clinical endpoints. , These studies suggested that yoga may reduce many IRS-related risk factors for CVD, may improve clinical outcomes, and may aid in the management of CVD and other IRS-related conditions.

Cysarz, D., & Bussing, A., (2005) studied the effects of meditation on a specific aspect of breathing: Authors measured this pattern of resting pulse rate variability as 9 inexperienced meditators practiced two kinds of meditation: seated Zen meditation (breath and thought awareness), and Kinhin (walking) meditation. During

both types of meditation, breathing rate lowered, the highest resting pulse rate (during inhalation) lowered, and the lowest resting pulse rate (during exhalation) increased.

Wachholtz AB, Pargament KI (2005) conducted the study compared the mental, physical, and spiritual health benefits of secular and spiritual forms of meditation. Participants (68 college students) were taught either a spiritual meditation technique (a mantra meditation using "God is love" or a similar phrase), a non-spiritual meditation technique (using a phrase like "I am happy"), or a relaxation technique to practice for 20 min a day for two weeks. After two weeks, participants returned to the lab, practiced their technique for 20 min, and placed their hand in a cold-water bath of 2 degrees Celsius for as long as they could endure it. Participants practicing spiritual meditation tolerated pain almost twice as long as the other two groups. In addition, the spiritual meditation group showed positive mental and spiritual health gains: they reported greater decreases in anxiety, greater positive mood, greater spiritual health (i.e., "feeling close to God"), and more spiritual experiences than the other two groups. Resting pulse rate decreased for all groups while they practiced their techniques; there was no difference in resting pulse rate between groups

Raju, P.S.,et.al, (1997) Conducted the study on Influence of Intensive Yoga Training on Physiological Changes in 6 Adult Women. The short-term effects of 4 weeks of intensive yoga practice on physiological responses in six healthy adult female volunteers were measured using the maximal exercise treadmill test. Yoga practice involved daily morning and evening sessions of 90 minutes each. Pre- and post-yoga exercise performance was compared. Maximal work output ($W_{\max}$) for the group increased by 21%, with a significantly reduced level of oxygen consumption per unit work but without a concomitant significant change in resting pulse rate. After intensive yoga training, at 154 Wmin^{-1} (corresponding to $W_{\max}$ of the pre-yoga maximal exercise

test) participants could exercise more comfortably, with a significantly lower resting pulse rate ($p < 0.05$), reduced minute ventilation ($p < 0.05$), reduced oxygen consumption per unit work ($p < 0.05$), and a significantly lower respiratory quotient ($p < 0.05$). They suggested that yoga has some transparently different quantifiable physiological effects to other exercises.

Pramanik T, et.al, (2009) investigated immediate effect of slow pace bhasrika pranayama on blood pressure and resting pulse rate . The objective of this study was to evaluate the immediate effect of slow pace bhasrika pranayama (respiratory rate 6/min) for 5 minutes on resting pulse rate and blood pressure and the effect of the same breathing exercise for the same duration of time (5 minutes) following oral intake of hyoscine-N-butylbromide (Buscopan), a parasympathetic blocker drug. They used the subjects and method for this study were Resting pulse rate and blood pressure of volunteers ($n = 39$, age = 25-40 years) was recorded following standard procedure. The results of the study was noted that after slow bhasrika pranayamic breathing (respiratory rate 6/min) for 5 minutes, both the systolic and diastolic blood pressure decreased significantly with a slight fall in resting pulse rate . No significant alteration in both blood pressure and resting pulse rate was observed in volunteers who performed the same breathing exercise for the same duration following oral intake of hyoscine-N-butylbromide.

Raghuraj P, and Telles S. (2008) conducted the study on immediate effect of specific nostril manipulating yoga breathing practices on autonomic and respiratory variables. The effect of right, left, and alternate nostril yoga breathing (i.e., RNYB, LNYB, and ANYB, respectively) were compared with breath awareness (BAW) and normal breathing (CTL). Autonomic and respiratory variables were studied in 21 male volunteers with ages between 18 and 45 years and experience in the yoga breathing

practices between 3 and 48 months. Subjects were assessed in five experimental sessions on five separate days. The sessions were in fixed possible sequences and subjects were assigned to a sequence randomly. Each session was for 40 min; 30 min for the breathing practice, preceded and followed by 5 min of quiet sitting. Assessments included resting pulse rate variability, skin conductance, finger plethysmogram amplitude, breath rate, and blood pressure. Following RNYB there was a significant increase in systolic, diastolic and mean pressure. In contrast, the systolic and diastolic pressure decreased after ANYB and the systolic and mean pressure were lower after LNYB. Hence, unilateral nostril yoga breathing practices appear to influence the blood pressure in different ways. These effects suggest possible therapeutic applications.

Patra S, and Telles S, (2010) conducted the study on Resting pulse rate variability during sleep following the practice of cyclic meditation and supine rest. Day time activities are known to influence the sleep on the following night. Cyclic meditation (CM) has recurring cycles. Previously, the low frequency (LF) power and the ratio between low frequency and high frequency (LF/HF ratio) of the resting pulse rate variability (HRV) decreased during and after CM but not after a comparable period of supine rest (SR). In this study, on thirty male volunteers, CM was practiced twice in the day and after this the HRV was recorded (1) while awake and (2) during 6 h of sleep (based on EEG, EMG and EGG recordings). This was similarly recorded for the night's sleep following the day time practice of SR. Participants were randomly assigned to the two sessions and all of them practiced both CM and SR on different days. During the night following day time CM practice there were the following changes; a decrease in resting pulse rate, LF power (n.u.), LF/HF ratio, and an increase in the number of pairs of Normal to Normal RR intervals differing by more than 50 ms divided by total number of all NN intervals (pNN50) ($P < 0.05$, in all cases, comparing sleep following CM

compared with sleep following SR). No change was seen on the night following SR. Hence yoga practice during the day appears to shift sympatho-vagal balance in favor of parasympathetic dominance during sleep on the following night.

Upadhyay Dhungel K, et.al, (2008) conducted the study on effect of alternate nostril breathing exercise on cardiorespiratory functions. Pranayama (breathing exercise), one of the yogic techniques can produce different physiological responses in healthy individuals. The responses of Alternate Nostril Breathing (ANB) the Nadisudhi Pranayama on some cardio-respiratory functions were investigated in healthy young adults. The subjects performed ANB exercise (15 minutes everyday in the morning) for four weeks. Cardio-respiratory parameters were recorded before and after 4-weeks training period. A significant increment in Peak expiratory flow rate (PEFR L/min) and Pulse pressure (PP) was noted. Although Systolic blood pressure (SBP) was decreased insignificantly, the decrease in pulse rate (PR), respiratory rate (RR), diastolic blood pressure (DBP) were significant. Results indicate that regular practice of ANB (Nadisudhi) increases parasympathetic activity.

Khalsa SS, et.al, (2008) conducted the study on Interoceptive awareness in experienced meditators. Attention to internal body sensations is practiced in most meditation traditions. Many traditions state that this practice results in increased awareness of internal body sensations, but scientific studies evaluating this claim are lacking. We predicted that experienced meditators would display performance superior to that of nonmeditators on heartbeat detection, a standard noninvasive measure of resting interoceptive awareness. We compared two groups of meditators (Tibetan Buddhist and Kundalini) to an age- and body mass index-matched group of nonmeditators. Contrary to our prediction, we found no evidence that meditators were superior to nonmeditators in the heartbeat detection task, across several sessions and respiratory modulation

conditions. Compared to nonmeditators, however, meditators consistently rated their interoceptive performance as superior and the difficulty of the task as easier. These results provide evidence against the notion that practicing attention to internal body sensations, a core feature of meditation, enhances the ability to sense the heartbeat at rest.

Danucalov MA, et.al, (2008) studied Cardiorespiratory and metabolic changes during yoga sessions: the effects of respiratory exercises and meditation practices. The novelty of this study was to investigate the changes in cardiorespiratory and metabolic intensity brought about by the practice of pranayamas (breathing exercises of yoga) and meditation during the same hatha-yoga session. The technique applied was the one advocated by the hatha-yoga system. Nine yoga instructors-five females and four males, mean age of 44 ± 11 , 6, were subjected to analysis of the gases expired during three distinct periods of 30 min: rest, respiratory exercises and meditative practice. A metabolic open circuit computerized system was applied (VO2000, MedGraphics-USA). The oxygen uptake (VO_2) and the carbon dioxide output (VCO_2) were statistically different ($P \leq 0.05$) during meditation and pranayama practices when compared with rest. The resting pulse rate also suffered relevant reductions when results at rest were compared with those during meditation. A smaller proportion of lipids was metabolized during meditation practice compared with rest. The results suggest that the meditation used in this study reduces the metabolic rate whereas the specific pranayama technique in this study increases it when compared with the rest state.

Frostell C, et.al, (1983) studied the effects of high-frequency breathing on pulmonary ventilation and gas exchange. The effects of spontaneous high-frequency breathing (HFB) on lung function were evaluated in three subjects highly trained in the practice of yoga. Transpulmonary pressure was measured by an esophageal balloon catheter and gas flow by pneumotachography. The abdominal and rib cage contributions

to tidal breathing were measured separately by respiratory inductive plethysmography. Gas exchange was studied by the conventional technique and by multiple inert gas elimination. During HFB, respiratory rate increased to 232 cycles/min with a tidal volume of 0.35 liter. This resulted in a more than 10-fold increase in expired minute ventilation to approximately 90 l/min. The transpulmonary pressure varied by 20 cmH₂O, with the calculated elastic, resistive, and accelerative components varying by 2, 20, and 8 cmH₂O, respectively. Respiratory work increased more than 200-fold in comparison with resting ventilation. A phase shift between thoracic and abdominal breathing was observed and was interpreted as a volume displacement of approximately 30 l/min between the two parts of the respiratory system. Arterial oxygen and carbon dioxide tension remained normal. Bohr dead space increased, while acetone dead space remained unaltered. A bimodal distribution of ventilation-perfusion ratios (VA/Q) was observed, with one mode in normal and another in "high" VA/Q regions.

Rajakumar.J (2010) conducted the study on the Impact of Yogic Practices and Physical Exercises on Selected Physiological Variables among the Inter-Collegiate Soccer Players. The purpose of the study was to analyze the impact of yogic practices and physical exercises on selected physiological variables among the intercollegiate soccer players. To achieve this purpose, sixty (60) male intercollegiate soccer players from the various colleges; Chennai were selected at random. Their age ranged between 17 to 22. The selected subjects were divided into three equal groups of 20 each, namely yogic practice group (Group A), physical exercises group (Group B) and control group (Group C). The experimental groups have underwent 12 weeks of training namely; yogic practices and physical exercises respectively, whereas the control group (Group C) maintained their daily routine activities and no special training was given. The subjects of the two groups were tested using standardized tests and procedures on selected physiological

variables before and after the training period to find out the training efforts in the following test items: Resting pulse rate through stethoscope, Breath holding time through digital stop watch, Peak flow rate through Wright's peak flow meter. The collected data were analyzed statistically through Analysis of Co-variance (ANACOVA) and Schiff's post hoc test to find out the pre and post training performances, compare the significant difference between the adjusted final means and the better group. The yogic practice group showed significant improvement due to 12 weeks training on resting pulse rate, breath holding time and peak flow rate compared to the physical exercise and control group. In the overall training effects in terms of improved number of physiological variables and their magnitude of improvement through training, yogic practice group is found to be the better group when compared to the other two groups.

Bhargava R, et.al, (1988) investigated on autonomic responses to breath holding and its variations following pranayama. Autonomic responses to breath holding were studied in twenty healthy young men. Breath was held at different phases of respiration and parameters recorded were Breath holding time, resting pulse rate systolic and diastolic blood pressure and galvanic skin resistance (GSR). After taking initial recordings all the subjects practised Nadi-Shodhana Pranayama for a period of 4 weeks. At the end of 4 weeks same parameters were again recorded and the results compared. Baseline resting pulse rate and blood pressure (systolic and diastolic) showed a tendency to decrease and both these autonomic parameters were significantly decreased at breaking point after pranayamic breathing. Although the GSR was recorded in all subjects the observations made were not conclusive. Thus pranayama breathing exercises appear to alter autonomic responses to breath holding probably by increasing vagal tone and decreasing sympathetic discharges.

Joshi LN, et.al, (1992) studied the effect of short term 'Pranayam' practice on breathing rate and ventilatory functions of lung. Thirty three normal male and forty two normal female subjects, of average age of 18.5 years, underwent twelve weeks course in 'Pranayam' and their ventilatory lung functions were studied before and after this practice. They had improved ventilatory functions in the form of lowered respiratory rate (RR), and increases in the forced vital capacity (FVC), forced expiratory volume at the end of 1st second (FEV1%), maximum voluntary ventilation (MVV), peak expiratory flow rate (PEFR-lit/sec), and prolongation of breath holding time.

Madanmohan, Thombre DP, et.al (1992) studied the effect of yoga training on reaction time, respiratory endurance and muscle strength. There was evidence that the practice of yoga improves physical and mental performance. This investigation was undertaken to study the effect of yoga training on visual and auditory reaction times (RTs), maximum expiratory pressure (MEP), maximum inspiratory pressure (MIP), 40 mmHg test, breath holding time after expiration (BHTexp), breath holding time after inspiration (BHTinsp), and hand grip strength (HGS). Twenty seven student volunteers were given yoga training for 12 weeks. There was a significant ($P < 0.001$) decrease in visual RT (from 270.0 ± 6.20 (SE) to 224.81 ± 5.76 ms) as well as auditory RT (from 194.18 ± 6.00 to 157.33 ± 4.85 ms). MEP increased from 92.61 ± 9.04 to 126.46 ± 10.75 mmHg, while MIP increased from 72.23 ± 6.45 to 90.92 ± 6.03 mmHg, both these changes being statistically significant ($P < 0.05$). 40 mmHg test and HGS increased significantly ($P < 0.001$) from 36.57 ± 2.04 to 53.36 ± 3.95 s and 13.78 ± 0.58 to 16.67 ± 0.49 kg respectively. BHTexp increased from 32.15 ± 1.41 to 44.53 ± 3.78 s ($P < 0.01$) and BHTinsp increased from 63.69 ± 5.38 to 89.07 ± 9.61 s ($P < 0.05$). Our results show that yoga practice for 12 weeks results in significant reduction in visual and

auditory RTs and significant increase in respiratory pressures, breath holding times and HGS.

Makwana K, et.al. (1988) studied the effect of short term yoga practice on ventilatory function tests. Twentyfive normal male volunteers undergoing a ten weeks course in the practice of yoga have been studied by some parameters of ventilatory functions tests. The observations recorded at the end of ten weeks of the course have shown improved ventilatory functions in the form of lowered respiratory rate, increased forced vital capacity, FEV1, maximum breathing capacity and breath holding time, while tidal volume and %FEV1, did not reveal any significant change. Thus, a combined practice of yoga seems to be beneficial on respiratory efficiency.

2.5. STUDIES ON PSYCHOLOGICAL VARIABLES

Yadav RK, et.al, (2005) conducted the study was Effect of a comprehensive yoga-based lifestyle modification program on lipid peroxidation. The study measured the concentration of thiobarbituric acid reactive substances (TBARS) in blood as an indicator of oxidative stress at the beginning and at the end of a comprehensive yoga-based lifestyle modification program (YLMP). The data was collected from 104 subjects (59 male, 45 female), 19-71 years of age (mean $\pm$ SD, 41.2 $\pm$ 14.6 years). The YLMP consisted of a nine-day educational out-patient course on the theory and practice of yoga and included, besides a daily one-hour practice of physical postures (asanas) and breathing exercises (pranayama), lecture and films on yoga, stress management and nutrition, practice of meditation and shavasana (a relaxation technique), and individual counseling. Venous blood samples were collected on the first and last day of the course. The serum concentration of TBARS decreased significantly from 1.72 $\pm$ 0.72 nmoles/ml on day 1 to 1.57 $\pm$ 0.72 nmoles/ml on day 10 ($P < 0.05$). The study suggested that a brief low cost lifestyle intervention based on yoga reduces oxidative stress.

Lane, J.D.,et.al,(2007).conducted the study on Brief Meditation Training can Improve Perceived Stress and Mood. They designed a brief meditation intervention designed to be non-sectarian, inexpensive, and easy to implement in a wide range of contexts, including medical settings. 200 participants were recruited for a "Calm Your Stress Study." Participants were instructed to choose a sound, word, or brief phrase as a mantra, and to mentally repeat the mantra for 15-20 minutes. Participants were instructed to notice any thoughts or sensations that distracted their attention from the mantra, and return their focus to the mantra. This study was, in many ways, a test of how little instruction is needed to produce benefits. Participants learned the practice in a one-hour session and were instructed to practice twice daily for three months. Three follow-up sessions were held over the first two weeks of the study to reinforce instructions and answer questions. Participants completed self-report measures of mood, anxiety, stress, and psychological symptoms before the first session and at three follow-up time points (4 weeks, 8 weeks, and 12 weeks). 133 of the original 200 participants (101 women and 32 men; mean age of 38 years) completed at least one of the follow-ups. Participants showed significant decreases in negative mood, anxiety, stress, and psychological symptoms. These improvements were evident at the first follow-up and stable over the remaining follow-ups. Importantly, participants who practiced the meditation more frequently (daily) showed the greatest improvements. A secondary finding of interest is that participants with high levels of neuroticism (a personality trait related to emotional reactivity and negative moods) were particularly likely to benefit from the meditation training.

Dvivedi J, et.al, (2008) investigated the effect of '61-points relaxation technique' on stress parameters in premenstrual syndrome. Premenstrual Syndrome is a psychoneuroendocrine stress related disorder and more than 300 treatment modalities for

PMS show that the existing remedies have not provided satisfactory help to relieve PMS. 61-points relaxation exercise (61-PR), a relatively less known hatha yoga technique, is a successful means of stress relaxation and is expected to relieve PMS as well. This study was conducted on 50 clinically healthy women volunteers who were in their reproductive age group and in their premenstrual period, from which a control group (n = 20) and a PMS group (n = 30) based on the symptoms were identified. In both groups basal resting pulse rate (HR/min), systolic (SBP; mmHg) and diastolic blood pressure (DBP; mmHg), electromyogram (EMG; mV), electrodermal galvanic activity (EDG; microv), respiratory rate (RR/min) and peripheral temperature (T; degrees F) were recorded and the subjects were taken through a guided 61-PR. The symptoms and parameters were re-recorded after the 61-PR. In control group, the basal HR was 82.06 $\pm$ 8.07, SBP 111.95 $\pm$ 8.23, DBP 76.8 $\pm$ 6.42, EMG 4.08 $\pm$ 2.99, EDG 9.77 $\pm$ 3.29, RR 15.60 $\pm$ 3.77 and T was 97.86 $\pm$ 0.63. After 10 minutes of 61-PR, HR (77.27 $\pm$ 10.85, $P < 0.05$), SBP (107.35 $\pm$ 7.41, $P < 0.05$), DBP (75.25 $\pm$ 7.57, $P < 0.05$), EMG (2.07 $\pm$ 1.90, $P < 0.05$), EDG (8.06 $\pm$ 2.87, $P < 0.05$), RR (16.00 $\pm$ 4.12, $P < 0.05$) fell significantly and T (97.97 $\pm$ 0.64, $P > 0.05$) rose significantly. In the PMS group, the basal HR was 90.61 $\pm$ 8.46, SBP 122.5 $\pm$ 11.52, DBP 83.53 $\pm$ 8.26, EMG 5.79 $\pm$ 2.75, EDG 13.14 $\pm$ 6.54, RR 19.13 $\pm$ 3.76 and T was 93.43 $\pm$ 5.29. After 10 minutes of 61-PR, HR (75.58 $\pm$ 10.11, $P < 0.0001$), SBP (114.53 $\pm$ 9.70, $p < 0.0001$), DBP (77.46 $\pm$ 8.68, $P < 0.0001$), EMG (2.56 $\pm$ 1.77, $P < 0.0001$), EDG (10.64 $\pm$ 5.72, $P < 0.0001$), and RR (16.13 $\pm$ 3.76, $P < 0.0001$) declined to a much greater extent and T (93.49 $\pm$ 5.28, $P < 0.0001$) rose more significantly. These results suggest a reduction in sympathetic activity by 61-PR, also the high basal sympathetic tone present in subjects of PMS group due to stress is considerably reduced by relaxation. 61-PR is effective in providing relief

from PMS and may be a useful adjuvant to medical therapy of PMS and other stress disorders.

Saeed SA, et.al, (2010) conducted the study on Exercise, yoga, and meditation for depressive and anxiety disorders. Anxiety and depression are among the most common conditions cited by those seeking treatment with complementary and alternative therapies, such as exercise, meditation, tai chi, qigong, and yoga. The use of these therapies is increasing. Several studies of exercise and yoga have demonstrated therapeutic effectiveness superior to no-activity controls and comparable with established depression and anxiety treatments (e.g., cognitive behavior therapy, sertraline, imipramine). High-energy exercise (i.e., weekly expenditure of at least 17.5 kcal per kg) and frequent aerobic exercise (i.e., at least three to five times per week) reduce symptoms of depression more than less frequent or lower-energy exercise. Mindful meditation and exercise have positive effects as adjunctive treatments for depressive disorders, although some studies show multiple methodological weaknesses. For anxiety disorders, exercise and yoga have also shown positive effects, but there are far less data on the effects of exercise on anxiety than for exercise on depression. Tai chi, qigong, and meditation have not shown effectiveness as alternative treatments for depression and anxiety.

Vallath N. P (2010) conducted the study of perspectives on yoga inputs in the management of chronic pain. Chronic pain is multi-dimensional. At the physical level itself, beyond the nociceptive pathway, there is hyper arousal state of the components of the nervous system, which negatively influences tension component of the muscles, patterns of breathing, energy levels and mindset, all of which exacerbate the distress, anger and affect the quality of life of the individual and family. Beginning with the physical body, Yoga eventually influences all aspects of the person: vital, mental,

emotional, intellectual and spiritual. It offers various levels and approaches to relax, energize, remodel and strengthen body and psyche. The asanas and pranayama harmonize the physiological system and initiate a "relaxation response" in the neuro endocrinal system. This consists of decreased metabolism, quieter breathing, stable blood pressure, reduced muscle tension, lower resting pulse rate and slow brain wave pattern. As the neural discharge pattern gets modulated, hyper arousal of the nervous system and the static load on postural muscle come down. The function of viscera improves with the sense of relaxation and sleep gets deeper and sustained; fatigue diminishes. Several subtle level notional corrections can happen in case the subject meditates and that changes the context of the disease, pain and the meaning of life. Meditation and pranayama, along with relaxing asanas, can help individuals deal with the emotional aspects of chronic pain, reduce anxiety and depression effectively and improve the quality of life perceived.

Chris C. Streeter, et.al, (2010) conducted the study on Effects of Yoga Versus Walking on Mood, Anxiety, and Brain GABA Levels: A Randomized Controlled MRS Study. The objective of the study were Yoga and exercise have beneficial effects on mood and anxiety. γ -Aminobutyric acid (GABA)-ergic activity is reduced in mood and anxiety disorders. The practice of yoga postures is associated with increased brain GABA levels. This study addresses the question of whether changes in mood, anxiety, and GABA levels are specific to yoga or related to physical activity. They used the methodology for this study were the Healthy subjects with no significant medical/psychiatric disorders were randomized to yoga or a metabolically matched walking intervention for 60 minutes 3 times a week for 12 weeks. Mood and anxiety scales were taken at weeks 0, 4, 8, 12, and before each magnetic resonance spectroscopy scan. Scan 1 was at baseline. Scan 2, obtained after the 12-week intervention, was followed by a 60-minute yoga or walking intervention, which was immediately followed by Scan 3. They found the results were

The yoga subjects (n = 19) reported greater improvement in mood and greater decreases in anxiety than the walking group (n = 15). There were positive correlations between improved mood and decreased anxiety and thalamic GABA levels. The yoga group had positive correlations between changes in mood scales and changes in GABA levels. They have concluded from this study were the 12-week yoga intervention was associated with greater improvements in mood and anxiety than a metabolically matched walking exercise. This is the first study to demonstrate that increased thalamic GABA levels are associated with improved mood and decreased anxiety. It is also the first time that a behavioral intervention (i.e., yoga postures) has been associated with a positive correlation between acute increases in thalamic GABA levels and improvements in mood and anxiety scales. Given that pharmacologic agents that increase the activity of the GABA system are prescribed to improve mood and decrease anxiety, the reported correlations are in the expected direction. The possible role of GABA in mediating the beneficial effects of yoga on mood and anxiety warrants further study.

Innes, K.E., et.al, (2005) conducted the study was controlled clinical trials on the effectiveness of yoga for the treatment of anxiety and anxiety disorders. The review covered major databases, as well as organizations such as the International Association of Yoga Therapists and the Yoga Biomedical Trust. Only eight controlled clinical trials were identified. The tradition/approach to yoga varied among studies, and studies focusing on meditation only were excluded. Most yoga interventions included asana, breathing, and relaxation. One study compared Kundalini yoga to mindfulness meditation and relaxation, and found that yoga was more effective in reducing anxiety than mindfulness meditation and relaxation. Several studies compared yoga to anti-anxiety medications, and reported greater improvements from yoga than medication. The

conclusion of study was quality of research not adequate to make strong claims about the benefits of yoga for anxiety.

Reiner R. (2008) conducted the study on integrating a portable biofeedback device into clinical practice for patients with anxiety disorders: results of a pilot study. This study examined the effectiveness of a portable Respiratory Sinus Arrhythmia (RSA) biofeedback device as an adjunct to CBT in persons with anxiety disorders and other disorders associated with autonomic dysfunction attending outpatient treatment. Participants were 24 individuals attending outpatient cognitive behavioral treatment for a range of anxiety disorders. Participants were assessed over a 3 week period. Outcomes included measures of anxiety (STAI-Y), sleep disturbances (PSQI), anger (STAEI), and subjective questions about the effectiveness of the device as a treatment adjunct. Significant reductions were found for anxiety and anger and for certain sleep variables (e.g. sleep latency). There was a significant dose-effect in that those who were more compliant had significantly greater reductions in most domains including sleep, anger and trait anxiety. Overall, participants found the device more helpful than other relaxation techniques such as meditation, yoga and unassisted breathing techniques but less helpful than exercise. The most frequently endorsed side effects were dizziness (15%) and sleepiness (55%). These preliminary results suggest that portable RSA biofeedback appears to be a promising treatment adjunct for disorders of autonomic arousal and is easily integrated into treatment. Results support the need for further investigation with more rigorous experimental designs.

Sephton, S.E., et.al. (2007) conducted the study on Mindfulness Meditation Alleviates Depressive Symptoms in Women with Fibromyalgia. They present a randomized controlled trial that examined the effects of a standard 8-week Mindfulness-Based Stress Reduction (MBSR) intervention on depression among women with

fibromyalgia, a chronic and often debilitating pain and fatigue disorder. 91 women (mean age of 48 years) were randomly assigned to either the MBSR intervention (2 groups of 25 women each) or a wait-list control group (41 women). Participants in the MBSR group attended weekly 2.5 hour sessions, led by a licensed clinical psychologist, that included practice and discussion. The authors describe the MBSR program as follows: "MBSR utilizes stress-reduction skills including sitting meditation, hatha yoga, and a somatically focused technique called the Body Scan. Participants are encouraged to maintain attention on their immediate experience with an attitude of openness, acceptance, curiosity, and compassion." As is typical with MBSR interventions, participants were encouraged to practice at home daily. Researchers compared the effects of MBSR versus standard medical care (the wait-list control group) at immediately following the 8-week intervention, and at an additional 2-month follow-up. At both time points, the MBSR group showed significant improvements in depression compared to the control group (the MBSR group improved, but the control group showed no improvement in depression over time). Interestingly, this study also measured pain and sleep, but rather than reporting these as outcomes, researchers used pain and sleep as covariates in their analysis of how MBSR influenced depression. The authors did not report whether participants also experienced significant improvement in pain and sleep, although one might guess that if the researchers had found such results, they would have reported the effects. The MBSR program has established research protocols that can be widely replicated by practitioners and researchers, and as evidenced by the number of research summaries reporting MBSR studies, the program has achieved significant success in obtaining funding and publishing data in peer-reviewed journals. It is worth noting this success and considering whether a field as diverse as Yoga, particularly with

its emphasis on the individual teacher/student relationship, would ever be able to create a standardized intervention and research protocol.

Howie-Esquivel J, et.al, (2010), conducted the study on Yoga in heart failure patients: a pilot study. The purpose of this study was to determine whether an 8-week yoga program was safe and would positively influence physical and psychological function in heart failure patients. They used the methodology for this study were stable Heart Failure patients were recruited ($n = 15$) and completed ($n = 12$) 8 weeks of yoga classes. Data collected were: safety (cardiac and orthopedic adverse events); physical function (strength, balance, endurance, flexibility); and psychological function (quality of life [QOL], depression scores, mindfulness) before and after 8 weeks of yoga classes. They found out the results from this study were Mean age was 52.4 ± 11.6 with three-fourths ($n = 9$) being male and Caucasian. No participant had any adverse events. Endurance ($P < .02$) and strength (upper $P = .04$ and lower body $P = .01$) significantly improved. Balance improved by 13.6 seconds (26.9 ± 19.7 to 40.0 ± 18.5 ; $P = .05$). Symptom stability, a subscale of QOL, improved significantly ($P = .02$). Although no subject was depressed, overall mood was improved. Subjects subjectively reported improvements in overall well-being. conclusion of the study were yoga practice was safe, with participants experiencing improved physical function and symptom stability. Larger studies are warranted to provide more nonpharmacological options for improved outcomes in patients with HF.

Uebelacker LA, et.al, (2010) conducted the study on Open trial of Vinyasa yoga for persistently depressed individuals: evidence of feasibility and acceptability The aim of this study was to assess the acceptability and feasibility of Vinyasa yoga as an adjunctive treatment for depressed patients who were not responding adequately to antidepressant medication. The authors also planned to ask participants for qualitative

feedback on their experience of the class and to assess change over time in depression and in possible mediating variables. The authors recruited 11 participants in 1 month for an 8-week open trial of yoga classes. They found that 10 participants completed follow-up assessments, 9 of 10 were positive about their experience, and all provided feedback about what was and was not helpful about yoga, as well as barriers to class attendance. Over the 2-month period, participants exhibited significant decreases in depression symptoms and significant increases in an aspect of mindfulness and in behavior activation. This pilot study provided support for continuing to investigate Vinyasa yoga as an adjunct treatment for depression.

Evans S, et.al, (2010). Studied on Iyengar yoga for young adults with rheumatoid arthritis: results from a mixed-methods pilot study. This pilot study investigated the feasibility of a single-arm, group-administered, six-week, biweekly Iyengar yoga (IY) program for eight young adults with Rheumatoid Arthritis. IY is known for its use of props, therapeutic sequences designed for patient populations, emphasis on alignment, and a rigorous teacher training. Treatment outcomes were evaluated using a mixed-methods approach that combined quantitative results from standardized questionnaires and qualitative interviews with participants. The results of the study were Initial attrition was 37% (n=3) after the first week because of scheduling conflicts and a prior non-RA related injury. However, the remaining participants (n=5) completed between 75% and 100% of treatment sessions (mean=95%). No adverse events were reported. The quantitative results indicated significant improvements in pain, pain disability, depression, mental health, vitality, and self-efficacy. Interviews demonstrated improvement in RA symptoms and functioning but uncertainty about whether the intervention affected pain. These preliminary findings indicate that IY is a feasible

complementary approach for young people with RA, although larger clinical trials are needed to demonstrate safety and efficacy.

Mendelson T, et.al, (2010), studied the Feasibility and preliminary outcomes of a school-based mindfulness intervention for urban youth.. This paper reported findings from a pilot randomized controlled trial assessing the feasibility, acceptability, and preliminary outcomes of a school-based mindfulness and yoga intervention. Four urban public schools were randomized to an intervention or wait-list control condition (n=97 fourth and fifth graders, 60.8% female). It was hypothesized that the 12-week intervention would reduce involuntary stress responses and improves mental health outcomes and social adjustment. Stress responses, depressive symptoms, and peer relations were assessed at baseline and post-intervention. Findings suggest the intervention was attractive to students, teachers, and school administrators and that it had a positive impact on problematic responses to stress including rumination, intrusive thoughts, and emotional arousal.

Ray US. Et.al, (2001) a study was undertaken to observe any beneficial effect of yogic practices during training period on the young trainees. 54 trainees of 20-25 years age group were divided randomly in two groups i.e. yoga and control group. Yoga group (23 males and 5 females) was administered yogic practices for the first five months of the course while control group (21 males and 5 females) did not perform yogic exercises during this period. From the 6th to 10th month of training both the groups performed the yogic practices. Physiological parameters like resting pulse rate , blood pressure, oral temperature, skin temperature in resting condition, responses to maximal and submaximal exercise, body flexibility were recorded. Psychological parameters like personality, learning, arithmetic and psychomotor ability, mental well being was also recorded. Various parameters were taken before and during the 5th and 10th month of

training period. Initially there was relatively higher sympathetic activity in both the groups due to the new work/training environment but gradually it subsided. Later on at the 5th and 10th month, yoga group had relatively lower sympathetic activity than the control group. There was improvement in performance at sub maximal level of exercise and in anaerobic threshold in the yoga group. Shoulder, hip, trunk and neck flexibility improved in the yoga group. There was improvement in various psychological parameters like reduction in anxiety and depression and a better mental function after yogic practices.

Gill A. et.al, (2010) conducted the study on Does exercise alleviate symptoms of depression? yes. Exercise reduces patient-perceived symptoms of depression when used as monotherapy (strength of recommendation [SOR]: B, meta-analysis of randomized controlled trials [RCTs] with significant heterogeneity). It relieves symptoms as effectively as cognitive behavioral therapy (CBT) or pharmacologic anti-depressant therapy (SOR: B, meta-analysis) and more effectively than bright light therapy (SOR: B, meta-analysis). Resistance exercise and mixed exercise (resistance and aerobic) work better than aerobic exercise alone (SOR: B, meta-analysis). High-frequency exercise is more effective than low-frequency exercise (SOR: B, small RCT). "Mindful" exercise, which has a meditative focus, such as tai chi and yoga, also reduces symptoms of depression (SOR: B, systematic review of RCTs).

Geeta S. Pastey et. Al (2007) had conducted the study on Impact of Emotional Maturity on Stress and Self Confidence of Adolescents. This study was to find out the impact of emotional maturity of adolescents on their stress and self confidence. Sample of the study consists of 105 adolescents studying in XI and XII class at Dharwad city Karnataka State, India. The scales such as emotional maturity (Singh and Bhargav, 1994), Self Confidence Inventory (Rekha Agnihotri, 1987) and Students' Stress Scale

(Deo, 1997) were administered on the selected sample. Along with responses to the above scales, some personal data information was also collected from the sample. The obtained responses were scored and converted to standard (T) scores, further subjected to 't' and 'F' tests. The findings revealed that the adolescents with high emotional maturity have significantly high stress ($t=10.44$; $p<0.001$) and self-confidence ($t=-2.92$; $p<0.01$) when compared to those with low emotional maturity. Adolescents with more number of siblings have shown significantly higher level of self-confidence ($t=2.96$; $p<0.01$) than their counter parts. It is also found that educational level of father has significantly influenced stress of their adolescent children ($F=5.303$; $p<0.01$). Adolescent boys tend to have significantly higher stress than girls ($t=1.72$) and girls tend to have significantly high self confidence ($t=1.83$). Adolescents with high emotional maturity have significantly higher stress and self confidence than those with lower emotional maturity.

Padma.H, (2010) conducted the study on the effect varied packages of yogic practices on selected physiological psychological and bio-chemical variables among Sinusites Women, The subjects of the study were 45 sinusites women. The age of the subjects were range from 25 to 60 years. The data were collected through scale questionnaire prepared Dr. Amarsingh and Dr. T.R. Sharma. The result of the study was P.E.T.P was higher in psycho- social factor and they were lesser in economic factor from this survey of study' P.E.T.P were not satisfaction in economically than the other factors.

Vasanth a c (2010) conducted the survey of job satisfaction among physical education teaching profession , The subjects of the study were 80 college Physical Education Teaching profession The age of the subjects were range from 25 to 60 years. The data were collected through scale questionnaire prepared Dr. Amarsingh and Dr. T.R. Sharma. The result of the study was P.E.T.P was higher in psycho- social

factor and they were lesser in economic factor from this survey of study' P.E.T.P were not satisfaction in economically than the other factors.

2.6 SUMMARY OF THE LITERATURE

The investigator has collected all the reviews related to yogic practices and related to clinical, physiological and psychological variables from the library of Poompuhar college (Autonomous) and Bharthidasan university and on the internet to provide sufficient knowledge to the readers and effective analysis of the present study.

Also the reviews show that the effect of yogic practices, Therapeutic exercise practices and combined practices that there was significant changes on physiological, psychological and clinical variables. The investigator has found much more studies made on yogic practices, Therapeutic exercise practices and combined practices. So the research was interested in the same and found it would be more useful for back ache patients for over all development based on the experience gained the investigator formulated suitable methodology to be an applied in this research this is presented in chapter III.

CHAPTER-III

METHODOLOGY

Research methodology involved the systematic procedures by which the research started from the initial identification of the problem to its final conclusion. The role of the methodology was to carry on the research work in a scientific and valid manner. The methodology used in this research involved the selection of subjects, selection of variables, instrument reliability, experimental design, and orientation of the subjects, tester reliability, pilot study, test administration and statistical technique employed for analysis of the data will be presented in detail.

3.1 SELECTION OF THE SUBJECTS

For the purpose of the study the researcher has selected 60 Low back ache men were randomly selected from Chennai city, between the age group of 30 to 40 years. The subjects were split into four groups I, II, III & IV each group contains 15 respondents.

Group -- I -- Yogic Practices

Group -- II -- Therapeutic exercises

Group -- III -- Combined (Yogic practices & Therapeutic exercises)

Group -- IV -- Control Group

3.2 SELECTION OF THE VARIABLES

The researcher reviewed the available scientific literature pertaining to the present scenario and has selected the following three independent and nine dependent variables to test the experiment is presented in table I & II.

TABLE I
SELECTED INDEPENDENT VARIABLES OF THE STUDY

INDEPENDENT VARIABLES	
1.	Yogic practices
2.	Therapeutic exercises
3.	Combined (Yogic practices and Therapeutic exercises)

TABLE II
SELECTED DEPENDENT VARIABLES OF THE STUDY

SL. NO.	DEPENDENT VARIABLES	
1	Clinical Variables	1. Pain
		2. Cadence
		3. Range of Motion
2	Physiological Variables	1.Systolic Blood Pressure
		2. Resting pulse rate.
		3. Respiratory rate
3	Psychological Variables	1.Stress
		2.Anxiety
		3. Self confidence

3.3 EXPERIMENTAL DESIGN

The study was formulated as a true random group design from the research design. For the purpose of the study the subjects of sixty Low back ache patients between the age group of 30 to 40 years were selected. The duration of training session in alternative days in a week and duration of the training 45 to 60 minutes. The random group design was used as experimental design for this study. The subjects were selected

randomly divided in to four groups namely three experimental group and one control group. All the groups were tested on selected variables before the training. After the pre test scores recorded the experimental groups went training as follows.

Group I - Underwent training on Yogic Practices.

Group II - Underwent training on Therapeutic Exercises.

Group III - Underwent training on Combined Practices (Yogic practices & Therapeutic exercises).

Group IV - As a control group underwent no training.

The experimental group – I were given training for about twelve weeks i.e. from Monday, Wednesday and Friday (three days a week) and experimental group – II were given training for about twelve weeks i.e. from Tuesday, Thursday and Saturday (three days a week) and experimental group III combined practices group were given training for about twelve weeks i.e. from Monday, Wednesday and Friday (three days a week). The post tests were also recorded on the clinical, physiological and psychological variables after the period of training. And both pre and post tests mean values were compared for analysis using statistical technique of analysis of covariance (ANCOVA).

3.4 PILOT STUDY

The pilot study was conducted with 12 Low backache men before the actual training started to assess the initial capacity of the subjects in order to fix the load on both the experimental group and difficulties were noted and rectified. Based on the response of the subjects in the pilot study and the calculated intra class correlation of the pilot study found that they were within the each of the individual`s capacity and showed that there was significant changes in physiological variables in systolic blood pressure, respiratory rate, resting pulse rate , and psychological variables in stress, anxiety, self

confidence and clinical variables in pain, range of motion and cadence. This enabled the investigator to adapt suitable training schedule for the study.

3.5 CRITERION MEASURES

By glancing the literature and in consultation with professionals and experts the following criterion measures were selected for measuring the variables in this study is presented in the table III.

TABLE III
CRITERIAN MEASURES AND TEST INSTRUMENTS USED

VARIABLES	INSTRUMENT USED
Pain	Visual Analogue Scale (VAS)”
Cadence	Stop watch calculation
Range of motion	measured by instrument “Goniometer”
Systolic blood pressure	Portable Automatic Arm Blood Pressure Monitor (citizen equipment)
Resting pulse rate	Portable Automatic monitor (citizen equipment)
Respiratory rate	Digital Stop Watch
Stress	Latha’s stress questionnaire (1997)
Anxiety	Tayler.(1952).
Self confidence	Rekha Agnihortry (1987)

3.6 RELIABILITY OF DATA

The reliability of data was censured by using standard instruments and by establishing tester competency and reliability of the test. The investigator took all the measurements with the intense of other professionals from a recognized hospital with regard to physiological test.

3.7 RELIABILITY OF INSTRUMENT

Standardized equipments were used for the testing procedures. The equipments were used for this study citizen make digital portables Blood Pressure monitor to measure the systolic blood pressure, resting pulse rate, digital stop watch used to measure respiratory rate and clinical variables used by scale and stop watch and Goniometer and Standardized questionnaires used to assess the stress, anxiety and self confidence for this study. The entire instrument used for this study were in good condition and workable. The calibrations were tested and found to be accurate enough to serve the purpose of this study.

3.8 TESTER`S RELIABILITY

The reliability of data together with the reliability of the tester was ensured by appointing an authorized personal from a recognized hospital. The investigator took all the measurement with the assistance of other professionals from recognized hospitals with regard to Physiological and clinical test. Before conducted the test the researcher discussed about testing procedure with concerned guide and staff members and got sufficient experience to administered the test.

3.9 SUBJECT RELIABILITY

The test and retest also conducted to the same subjects under similar condition by the same tester.

3.10 ORIENTATION OF THE SUBJECTS

Prior to the administration of the test, a detailed discussion was carried out with the subjects about the purpose of the study, training procedures and techniques, its benefits and limitations by the researcher. Before the scientific test administration,

procedure was explained in detail and proper understanding; co-operation was obtained for reliability of the data.

3.11 TRAINING SCHEDULE

During the training period, the experimental group underwent their respective training program in addition to their regular program of the course of study as per their curriculum. Group I, underwent Yogic practices in Monday, Wednesday and Friday, Group II underwent Therapeutic exercise in Tuesday, Thursday and Saturday and Group III underwent combined practices (yogic practices and Therapeutic exercise practices in in Monday, Wednesday and Friday per week for twelve weeks. The duration of training session in alternative days in a week and duration of the training 45 to 60 minutes, Group IV acted as control group who did participate in any specific training on par with experimental group. The entire subjects involved in this study were carefully monitored throughout the training programme.

3.11.1 TRAINING PROGRAMME FOR EXPERIMENTAL GROUPS

TABLE IV

GROUPS	PROGRAMMES
Experimental Group - I	Yogic practices
Experimental Group - II	Therapeutic exercises
Experimental Group - III	Combined (Yogic practices & Therapeutic exercises
Control Group	No training

3.11.2 TRAINING SCHEDULE OF EXPERIMENTAL GROUP – I (Yogic Practices)

Training Programme

The following training programme was given for Yogic practices group at 6.00am to 7.00 am.

TABLE - V

YOGIC PRACTICES FOR FIRST FOUR WEEKS

S. No	Yogic practices	Duration	Repetition	Sets	Rest between practices	Rest Between Sets	Frequency per week
1	Sitilikarana Vyayama (loosening exercises)	5 minutes	2	2	5 to 10 secs	5 – 6 minutes	3 days in a week
2	Surya Namaskar	6 minutes	2	2	10 to 15 secs		
3	Ardhakati chakrasana	3 minutes	2	2	5 to 10 secs		
4	Ardhachakraasana	3 minutes	2	2	5 to 10 secs		
5	Parivarttha trikonaasana	3 minutes	2	2	5 to 10 secs		
6	Bhujangaasana	3 minutes	2	2	5 to 10 secs		
7	Salabhaasana	3 minutes	2	2	5 to 10 secs		
8	Savasana	6 minutes	1	1	5 to 10 secs		
9	Chandra & Surya anuloma & viloma	3 minutes	2	1	5 to 10 secs		
10	Nadishodana Pranayama	3 minutes	2	1	5 to 10 secs		
11	Bhramari & Bhastrika Pranayama	3 minutes	2	1	5 to 10 secs		
12	Pain Meditation	5 minutes	1	1	-		

TABLE – VI

YOGIC PRACTICES FOR SECOND FOUR WEEKS

S.No	Yogic practices	Duration	Repetition	Sets	Rest between practices	Rest Between Sets	Frequency per week
1	Sitilikarana Vyayama (loosening exercises)	4 minutes	3	2	5 to 8 secs	5 – 6 minutes	3 days in a week
2	Surya Namaskar	6 minutes	3	2	5 to 10 secs		
3	Ardhakati chakrasana	3 minutes	3	2	5 to 8 secs		
4	Ardhachakraasana	3 minutes	3	2	5 to 8 secs		
5	Parivarttha trikonaasana	3 minutes	3	2	5 to 8 secs		
6	Bhujangaasana	3 minutes	3	2	5 to 8 secs		
7	Salabhaasana	3 minutes	3	2	5 to 8 secs		
8	Vakrasana	3 minutes	3	1	5 to 8 secs		
9	Savasana	6 minutes	1	-	-		
10	Nadi Sodhana Pranayama	3 minutes	3	1	5 to 8 secs		
11	Sheetali & Seetkari Pranayama	3 minutes	3	1	5 to 8 secs		
12	Pain Meditation	5 minutes	1	1	-		

TABLE – VII

YOGIC PRACTICES FOR THIRD FOUR WEEKS

S. No	Yogic practices	Duration	Repetition	Sets	Rest between practices	Rest Between Sets	Frequency per week
1	Sitilikarana Vyayama (loosening exercises)	3minutes	3	2	3 to 6 secs	3 – 5 minutes	3 days in a week
2	Surya Namaskar	4 minutes	3	2	5 to 8 secs		
3	Ardhakati chakrasana	2 minutes	3	3	3 to 6 secs		
3	Ardhachakraasana	3 minutes	3	3	3 to 6 secs		
4	Parivarttha trikonaasana	3 minutes	3	3	3 to 6 secs		
5	Bhujangaasana	3 minutes	3	3	3 to 6 secs		
6	Salabhaasana	3 minutes	3	3	3 to 6 secs		
7	Vakrasana	3 minutes	3	2	3 to 6 secs		
8	Ustraasana	3 minutes	3	2	3 to 6 secs		
9	Savasana	6 minutes	1	-	-		
10	Nadi Shodhana Pranayama	4 minutes	3	1	3 to 6 secs		
11	Bhastrika	4 minutes	3	1	-		
12	Pain Meditation	5 minutes	1	1	-		

YOGA PRAYER

SHANTHI MANTHRA (At the time of starting)

Om.....Om.....Om.....

Sahana Vavathu, Sahanou Bhunaktu

Sahaveeryam-Karvavahai

Tejaswinaa Vadhitamastu, Ma...Vidvishavahai

Om.... Shanthi..... Shanthi..... Shanthi hi.....

YOGIC PRACTICES:

STHITI (initial SITHILA (relaxation) Postures:

1. INITIAL STANDING POSTURE



2. STANDING RELAXATION POSTURE



3. INITIAL SITTING POSTURE



4. SITTING RELAXATION POSTURE



5. INITIAL PRONE POSTURE



6. PRONE RELAXATION POSTURE



7. INITIAL SUPINE POSTURE



8. SUPINE RELAXATION POSTURE

1. **SPECIAL PRACTICES FOR LOW BACK PAIN:**A). *STANDING:*a). *HAND STRETCH BREATHING: STHITI: TADASANA*

PRACTICE

STAGE 1 (HORIZONTAL)

EXHALE



INHALE



STAGE 2 (At 135 Degree)

INHALE



STAGE 3 - VERTICAL

INHALE



B. Hands In & Out Breathing STITHI: TADASANA

EXHALE



INHALE



C) FOLDED LEGS LUMBAR STRETCH

Type 1 (with one leg)



STITHI : Supine Posture

Type 2 (with both leg)



D) CROSSED LEGS LUMBAR STRETCH

STITHI : Supine Posture

Type-1 (Right leg crossed over left leg)



E) PAVANAMUKTAASANA
LUMBAR STRETCH

STITHI : Supine Posture



F).DORSAL STRETCH: *STHITI: Supine posture*



G) SEDUBANDHAASANA LUMBAR
STRETCH

STITHI : Supine Posture

Statge – 1 (Breathing)



Stage – 2 (Sedubandhaasana – Stretch)





H). TIGER BREATING

STHITI : VAJRAASANA

INHALE

EXHALE



I). RABBIT BREATING

STHITI : VAJRAASANA

(Rapid Breathing – Apical Lobe Breathing)



J). SASANGAASANA BREATING

STHITI : VAJRAASANA

(Inhale)

(Exhale)



K). BHUJANGAASANA
BREATHING
INHALE



STHITI: PRONE POSTURE

L). SALABHAASANA BREATHING
Type-1. (Ardha Salabhasana breathing)



STHITI : PRONE POSTURE
Type-2. (Salabhasana breathing)



M). STRAIGHT LEG RAISE
BREATHING
(Alternate legs raise with inhale)



STHITI : SUPINE POSTURE

N). SIDE LEG RAISE BREATHING
INHALE



STHITI : SUPINE POSTURE

O). SIDE LUMBAR STRETCH
INHALE



STHITI : SUPINE POSTURE
EXHALE



YOGASANAS:

ASANAS

ARDHAKATI CHAKRASANA

Technique:

- Stand firmly along with legs together (as in Tadasana).
- Press the heels and feet on the floor.
- Slowly stretch and raise the right arm above the head and extend with inhalation (refer Fig 2.0).
- Exhale slowly and move the trunk and right arm towards left side (refer Fig. 2.1). The ear will touch the right upper arm. The left hand should be sided on left leg thigh.
- Stay in this position for 15 to 30 seconds with normal breathing.
- Inhale, slowly move the trunk and arm in order to come back to the normal position.
- Repeat the same be bending on the other side.
- Practice this exercise two times on both the sides.



Fig 7

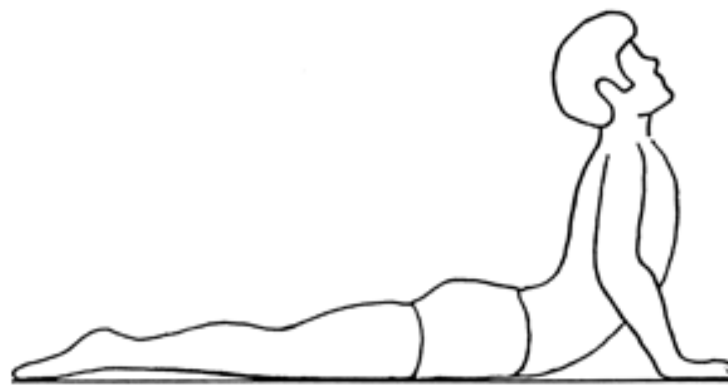
ARDHACHAKRAASANA:**Technique:**

- Support the back at the waist by the palms, fingers pointing forwards
- Inhale and Bend backwards from the lumbar region. Head bends backwards, stretching the muscles of the neck.
- Maintain the position for about a minute; normal breathing.
- Return to sthiti.
- Relax in sithila tadasana.

**Fig 8**

BHUJANGAASANA:**Steps**

- Tilt your head slightly backward.
- While inhaling slowly, raise your head and chest upwards by pressing down on the hands but letting contraction of the back take most of the strain.
- Your body from toes to the navel should rest on the floor.
- Then look into the sky as if a cobra is going to strike. Hold your breath in this pose as long as possible without feeling uncomfortable (initially hold your breath for 8 to 10 seconds at least).
- Then while exhaling, slowly return to the face-down position.
- Rest in Bal Asana pose.



Cobra Posture

Fig 9

SALABHAASANA:**Technique:-**

1. Take prone lying position, legs together, toes of the legs backward, sole towards the sky. Hands by the side, palms upward, fingers together the ground.
2. Folding both the hands at elbows bring them under the shoulder (as in Bhujangasana) fingers together, pointing forward
3. Now raise both the legs upward slowly without bending them at knees, and maintain. Then bring the legs down slowly.
4. Salabhasana (Second technique).The only difference in Salabhasana practiced traditionally is in the position of hands. In this technique the legs are raised keeping hands straight by the side, closing the fists and fingers towards sky. The remaining technique is same.

**Fig 10**

VAKRASANA :(twisted pose)**Steps:**

1. Keep your legs stretched in the sitting position. Raise the right leg by bending the knee and pull the foot until it rests by the side of your left knee.
2. Place your right hand behind the back without much twist of the trunk. Then bring the left arm over the right knee and hold the right ankle. Push your right knee as far to the left as possible offering good resistance to the left arm.
3. Now exhale and try to twist the trunk to the right side as much as possible taking good support from the left arm, and look towards the right shoulder. This is a complete twist to the right side.
4. Do this asana in the same manner and duration on the left side **also**.

**Fig 11**

PARIVARTHA TRIKONAASANA:

1. The Dog pose (Adho Mukha Svanasana) is a good asana to start this exercise. Start with the Dog position and put your right leg about one meter forward.
2. Put your hands next to your foot and carry your weight with the lower back on the heel of the foot in front. Raise your upper body until your back is straight. Without changing your posture and shifting your weight, twist your left foot diagonally with the heel toward the ground.
3. With your right hand, grasp your ankle or the under side of your lower leg and you see to it that the lower back carries your weight and that consequently you hardly rest on your right hand. With your back straight and your right hip stretched backward, look at a point on the ground and breathe in and out quietly. Press your left hand against the ankle or your lower leg and twist the upper body to the right and upward.
4. Try to support as much of your weight as possible with your back and to rest as little as possible on your right arm.. Because if you do, you lose the stretching motion in your back, allowing your lower back to sink down or to support yourself too much on your lower arm.
5. If you cannot twist any further, stretch your right hand upward.
6. Then twist your head to the right and upward, look upwards along your arm and stretch out your neck.

7. The better you do this exercise, the bigger will be the triangle between your leg in front, your arm and your side. Step back towards the Dog and repeat the exercise with your left leg in front.



Fig 12

USTRAASANA (Camel shaped asana)

1. Sit in Vajrasana which is very simple asana. While sitting bending your knees and touching the heels of with your buttocks. Your toe nails touching the floor and soles facing upwards. Sit in this asana for 30-40 seconds while your hands resting on the legs.
2. Now stand up whole your knees are still on the floor and your hands holding your waist for few seconds. Breathe normally.
3. Exhale and slowly start bending backwards until you touch soles of your feet. But hold on it is not easy and don't think that you will do it very first day. Don't go further if you feel pain in the back. Stop there and take it as your complete posture

where ever you can. Once you are able to hold you soles of your feet that is the complete posture. Stop there and try to bend yourself as much as you possibly can. Stay at your final position (whatever it is) for 40-60 seconds. Breathe normally.

4. Come back to vajar Asana and stay in it for 30-40 seconds to rest and breath normally. This is one complete Ustra-Asana. Repeat this asana three times and once you are quite good at it repeat 3-6 times at one go.



Fig 13

SHAVASANA -CORPSE POSTURE



Fig 14

- Step 1 Lie on the back with the feet comfortably apart.
- Step2 The spinal column is straight but not rigid and the arms rest
- Step 3 The head is in line with the spine eyes and mouth is closed gently.
- Step 4 Relax body completely.

PRANAYAMA

ANULOMA VILOMA

CHANDRA ANULOMA VILOMA-LEFT NOSTRIL YOGA BREATHING



Fig 15

- Step 1 Sit erect in Padmasana and Adopt Nasika mudra
- Step 2 Close the right nostril with fingers
- Step 3 Inhalation and exhalation through left nostril.

SURYA ANULOMA VILOMA-RIGHT NOSTRIL YOGA BREATHING**Fig 16**

- Step 1 Sit erect in Padmasana and Adopt Nasika mudra
- Step 2 Close the left nostril with fingers
- Step 3 Inhalation and exhalation through right nostril.

BRAHMARI -BUMBLE BEE BREATHING



Fig 17

Step 1 Sit comfortably in any meditative posture.

Step 2 Inhale slowly and deeply through the nose. Let the inhalation caress the throat area.

Step 3 Then gently plug the ears with the respective index fingers and closed eyes.

Step 4 Exhale slowly producing a long and continuous humming sound.

Step 5 Enjoy the sound and vibrations produced during these breathing techniques.

NADISHUDHI -ALTERNATE NOSTRIL BREATHING



Fig 18

Step 1 Sit comfortably in any meditative posture. Be calm and close the eyes.

Step 2 Close the right nostril with the right thumb.

Step 3 Now inhale slowly through the left nostril and fill the lungs.

Step 4 After complete inhalation, press the left nostril with the ring finger of the right hand and close the left nostril. Open the right nostril, exhale slowly.

Step 5 After complete exhalation, again inhale through the right nostril and fill the lungs.

Step 6 Close the right nostril by pressing it with the right thumb.

Step 7 After opening the left nostril, breathe out slowly.

Step 8 This process is one round of Nadi Shudhi Pranayama.

SHITALI PRANAYAMA

Shitali Pranayama cools the body and quenches thirst.

Preparation

- Sit on the favourite Asana (Padma asana, Vajra asana or Sukh asana) in a well ventilated room free from any distractions. Keep the waist, back, neck and spine erect. For the beginners, you can sit on a chair or sit cross legged on the yoga mat/ carpet keeping the back, neck and spine erect.
- Keep the hand in gyan mudra (press the first finger against the thumb and keeping other three fingers straight) on the knees.

Steps

- Protrude the tongue from the mouth and roll it like a tube.
- Draw in the air through the mouth with the hissing sound "SSSSS"
- Bring the tongue into the mouth and retain breath as long as you are comfortable.
- Exhale slowly through both nostrils.

Practice

- Do this pranayama 10 to 20 times.
- This pranayama can be done while standing/ walking also.
- You can practice this pranayama in the morning as well as in the evening during the summer season.

SHITKARI PRANAYAMA

Shitkari Pranayama cools the body and quenches thirst.

Preparation

- Sit on the favourite Asana (Padma asana, Vajra asana or Sukh asana) in a well ventilated room free from any distractions. Keep the waist, back, neck and spine erect. For the beginners, you can sit on a chair or sit cross legged on the yoga mat/ carpet keeping the back, neck and spine erect.
- Keep the hand in gyan mudra (press the first finger against the thumb and keeping other three fingers straight) on the knees.

Steps

- Fold the tongue so that the tip of the tongue might touch the upper palate.
- Draw in the air through the mouth with the hissing sound "SSSSS". The air flows over the tongue.
- Now, bring the tongue inside the mouth and retain breath as long as you are comfortable.
- Exhale slowly through both nostrils.

Practice

- Do this pranayama 10 to 20 times.
- This pranayama can be done while standing/ walking also.
- You can practice this pranayama in the morning as well as in the evening during the summer season.

BHASTRIKA PRANAYAMA

In Sanskrit Bhastrika means ‘bellows’. As a blacksmith blows his bellows rapidly, similarly you should move the breath rapidly.

Preparation

Sit on the favourite Asana (Padma asana, Vajra asana or Sukh asana) in a well ventilated room free from any distractions. Keep the waist, back, neck and spine erect. For the beginners, you can sit on a chair or sit cross legged on the yoga mat/ carpet keeping the back, neck and spine erect. Do not tax the body. Any time you feel discomfort, discontinue and take rest.

Steps

- Inhale and exhale quickly twenty times like the bellows of the blacksmith. While inhaling and exhaling a hissing sound is produced. You should start with rapid expulsions of breath following one another in rapid succession.
- When the required number of expulsions, say ten for a round, is finished, the final expulsion is followed by a deepest possible inhalation.
- The breath is suspended as long as it could be done with comfort.
- Then deepest possible exhalation is done very slowly. The end of this deep exhalation completes one set of this pranayama.
- Rest a while after one set by taking a few normal breaths. Do three sets daily in the morning.

MEDITATION: PAIN MANAGEMENT MEDITATION:

- First give thanks for your life. Then honor and be grateful to the aspects that have the greatest meaning in your life (i.e., Love, Truth, Acceptance, Compassion, Tolerance and Respect). Then take a few minutes to relax and find your meditative state.
- After those prayers and you've found your calm, then start to visualize that your heart is a rose bud that is starting to bloom. As the petals grow longer they start to glow with a pure light. As the flower starts to open it becomes brighter with the light of pure love and compassion.
- You can start to feel the warmth from the love and compassion growing through your heart and after a while all there is, is pure light. Then you begin to expand the light to the other parts of your body. To the base of your spine and to Mother Earth. To the top of your crown and to Father Sky.
- Take time to feel your body being bathed in this warmth of love and compassion. Then wrap your pain or suffering with the light. Visualize the pain and suffering being transformed or converted into love and compassion. Allow it to dissolve away until only the light of love and compassion are left.
- Now raise up this light through your crown to Father Sky and release the transmuted pain and suffering as love and compassion back onto the winds of the universe so your truth is known. Then slowly come back to your body.

SHAVASANA - CORPSE POSTURE



Fig 19

Step 1 Lie on the back with the feet comfortably apart.

Step 2 The spinal column is straight but not rigid and the arms rest

Step 3 The head is in line with the spine eyes and mouth is closed gently.

Step 4 Relax body completely.

THERAPEUTIC EXERCISE PRACTICES (EXPERIMENTAL GROUP – II)

- a) Double knee-to-chest stretch
- b) Pelvic tilt exercise
- c) Lower trunk rotation stretch
- d) Curl-up exercise
- e) Trunk flexion stretch
- f) Alternate arm- leg extension exercise
- g) Prone lumbar extension
- h) Alternate leg extension
- i) Hamstring stretch while standing

3.11.2.1 TRAINING SCHEDULE OF EXPERIMENTAL GROUP – II
(Therapeutic Exercises)

TABLE - VIII

THERAPEUTIC EXERCISE PRACTICES FOR FIRST FOUR WEEKS

S. No	THERAPEUTIC EXERCISES	Sets	Rest between practices	Rest Between Sets	Frequency per week
1	Double knee-to-chest stretch	1 -2	According to the patients	According to the patients	3 days in a week
2	Pelvic tilt exercise	1 -2			
3	Lower trunk rotation stretch	1 -2			
4	Curl-up exercise	1 -2			
5	Trunk flexion stretch	1 -2			
6	Alternate arm- leg extension exercise	1 -2			
7	Prone lumbar extension	1 -2			
8	Alternate leg extension	1 -2			
9	Hamstring stretch while standing	1 -2			

TABLE - IX**THERAPEUTIC EXERCISE PRACTICES FOR SECOND FOUR WEEKS**

S. No	THERAPEUTIC EXERCISES	Sets	Rest between practices	Rest Between Sets	Frequency per week
1	Double knee-to-chest stretch	2 -3	According to the patients	According to the patients	3 days in a week
2	Pelvic tilt exercise	2 -3			
3	Lower trunk rotation stretch	2 - 3			
4	Curl-up exercise	2 -3			
5	Trunk flexion stretch	2 -3			
6	Alternate arm- leg extension exercise	2 -3			
7	Prone lumbar extension	2 -3			
8	Alternate leg extension	2 -3			
9	Hamstring stretch while standing	2 -3			

TABLE - X**THERAPEUTIC EXERCISE PRACTICES FOR THIRD FOUR WEEKS**

S. No	THERAPEUTIC EXERCISES	Sets	Rest between practices	Rest Between Sets	Frequency per week
1	Double knee-to-chest stretch	3 -4	According to the patients	According to the patients	3 days in a week
2	Pelvic tilt exercise	3 -4			
3	Lower trunk rotation stretch	3 -4			
4	Curl-up exercise	3 -4			
5	Trunk flexion stretch	3 -4			
6	Alternate arm- leg extension exercise	3 -4			
7	Prone lumbar extension	3 -4			
8	Alternate leg extension	3 -4			
9	Hamstring stretch while standing	3 -4			

LOW BACK EXERCISES:

Unless instructed otherwise, do each exercise 1 to 5 times, twice each day. Gradually increase your workout to 10 repetitions twice a day. Use slow, smooth actions as you exercise. If you feel any discomfort while doing the exercises, stop immediately and contact your physician. Stop any exercise that increases back ache or causes tingling, numbness, or weakness in your legs.

1. Double knee-to-chest stretch

- a. Lie down on back.
- b. Pull both knees in to chest until you feel a comfortable stretch in lower back.
- c. Keep the back relaxed.
- d. Hold for 45 to 60 seconds.



Fig. 20

2. Pelvic tilt exercise

- a. Lie on back with knees bent, feet flat on floor, and arms at sides
- b. Flatten small of back against floor. (Hips will tilt upward.)
- c. Hold for 10 to 15 seconds and release. Gradually increase your holding time to 60 seconds.

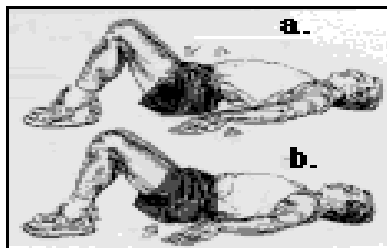


Fig 21

3. Lower trunk rotation stretch

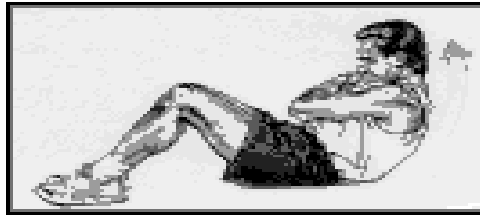
- a. Lie on back.
- b. Keeping back flat and feet together, rotate knees to one side.
- c. Hold for 45 to 60 seconds.



Fig. 22

4. Curl-up exercise

- a. Lie on the floor on back.
- b. Keeping arms folded across chest, tilt pelvis to flatten back. Tuck chin into chest.
- c. Tighten abdominal muscles while raising head and shoulders from floor.
- d. Hold for 10 seconds and release.
- e. Repeat 10 to 15 times. Gradually increase your repetitions.

**Fig 23**

5. Trunk flexion stretch

- a. On hands and knees, tuck in chin and arch back.
- b. Slowly sit back on heels, letting shoulders drop toward floor.
- c. Hold for 45 to 60 seconds.

**Fig 24**

6. Alternate arm-leg extension exercise

- a. Face floor on hands and knees.
- b. Raise left arm and right leg. Do not arch neck.
- c. Hold for 10 seconds and release.
- d. Raise right arm and left leg. Do not arch neck.
- e. Hold for 10 seconds and release.

**Fig 25**

7. Prone Lumbar Extension

Purpose: To extend your lower back.

- a). Lie on your stomach and place your hands on the floor near the sides of your head.
- b). slowly push your upper body off the floor by straightening your arms, but keep your hips on the floor. Hold for 10 seconds, and then relax your arms, moving back to the floor.



Fig 26

8. Alternate leg extension

- a). Lie on your stomach with your arms folded under your chin. Slowly lift one leg -- not too high -- without bending it, while keeping your pelvis flat on the floor. Slowly lower your leg and repeat with the other leg.



Fig 27

9. Hamstring stretch while standing

- a). Stand on right leg with left leg on table/chair.
- b). Stretch hamstring by slowly bending right knee.
- c). Hold for 30-45 sec.
- d). Repeat with other leg.



Fig 28

Experimental Group – III (three days) – Same as yogic practices and Therapeutic exercise of Experimental group – I & II

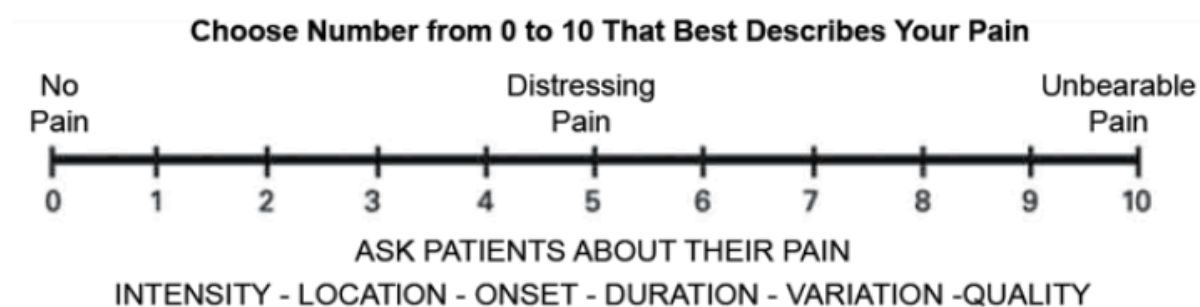
3.12 TEST ADMINISTRATION

3.12.1 CLINICAL TESTING (VARIABLES)

3.12.1.1 PAIN

Purpose : To measure the pain level in low back ache men.

Equipment: Visual Analogue Scale (VAS)



The VAS is administered as a paper and pencil measure. As a result, it cannot be administered verbally or by phone. No training is required other than the ability to use a ruler to measure distance to determine a score.

Procedure: The pain VAS is a continuous scale comprised of a horizontal (HVAS) or vertical (VVAS) line, usually 10 centimeters (100 mm) in length, anchored by 2 verbal

descriptors, one for each symptom extreme Instructions, time period for reporting, and verbal descriptor anchors have varied widely in the literature depending on intended use of the scale.

Practical Application:

Method of administration: The pain VAS is self-completed by the respondent. The respondent is asked to place a line perpendicular to the VAS line at the point that represents their pain intensity.

Time Taken: The VAS takes <1 minute to complete.

Scoring: Using a ruler, the score is determined by measuring the distance (mm) on the 10-cm line between the “no pain” anchor and the patient's mark, providing a range of scores from 0–100.

Score interpretation:

A higher score indicates greater pain intensity. Based on the distribution of pain VAS scores in osteoarthritis patients who described their pain intensity as none, mild, moderate, or severe, the following cut points on the pain VAS have been recommended: no pain (0–4 mm), mild pain (5–44 mm), moderate pain (45–74mm), and severe pain (75– 100 mm). Normative values are not available.

3.12.1.2 CADENCE

Purpose: To measure the number of steps per minute.

Equipment:

Stopwatch, paper and pencil.

A clear pathway with set distance (6, 8, 10 metres in length depending on distance tested)

Procedure:

Set Up: Measure and mark a 10-metre walkway

Add a mark at 2-metres

Add a mark at 8-metres

Instructions:

- The individual walks without assistance for 10 metres, with the time measured for the intermediate 6 metres to allow for acceleration and deceleration
- Assistive devices may be used, but must be kept consistent and documented for each test.
- Start timing when the toes pass the 2 metre mark
- Stop timing when the toes pass the 8 metre mark
- Can be tested at either preferred walking speed or maximum walking speed (ensure to document which was tested)
- Perform three trials and calculate the average of three trials

Patient Instructions

- Normal comfortable speed: “I will say ready, set, go. When I say go, walk at your normal comfortable speed until I say stop”
- Maximum speed trials: “I will say ready, set, go. When I say go, walk as fast as you safely can until I say

Scoring: Measured in Stop watch range from 90 to 120 steps / min

- Slow: 60 – 70 Steps / min.
- Medium: 80 – 90 Steps / min.
- Fast: 120 Steps / min.

3.12.1.3 RANGE OF MOTION

Purpose : To measure the knee movement.

Equipment: Goniometer

Procedure: Recorded in a relaxed prone lying position.

Scoring : Measured in Goniometer range from 0 to 135 degrees.

3.12.2 PHYSIOLOGICAL VARIABLES

3.12.2.1 BLOOD PRESSURE

Purpose: The purpose of this test is to measure the systolic blood pressure at rest.

Equipment: Citizens make digital portable blood Pressure monitor.

Procedure: The blood pressure was recorded at the beginning and end of the training periods using the equipment in a sitting relaxation position, since the equipment was fully automatic, the value were recorded accordingly.

Scoring: The blood pressure is indicated on the digital monitor.

3.12.2.2 RESTING PULSE RATE

Purpose: The purpose of this test is to measure the resting pulse rate at rest.

Equipment: Citizens make digital portable blood Pressure monitor.

Procedure: The resting pulse rate was recorded at the beginning and end of the training periods using the equipment in a sitting relaxation position, since the equipment was fully automatic, the value were recorded accordingly.

Scoring: The resting pulse rate is indicated in the digital monitor.

3.12.2.3 RESPIRATORY RATE

Purpose: The purpose was to measure the ability of the subject to number of breath per minute.

Equipment: Stop Watch.

Procedure: The subjects were made to sit relaxed and comfortably. Then the investigator simply involves counting the number of breaths for one minute by counting how many times the chest rises.

Scoring: Average respiratory rate reported in a healthy adult at rest is usually given as 12 breaths per minute (12/60 Hz) Accurate readings were obtained by counting the number of breaths over a full minute.

3.12.3 PSYCHOLOGICAL VARIABLES

3.12.3.1 STRESS

Purpose

To assess the stress level of the subjects

Equipment

Latha's stress questionnaire (1997) used to assess the stress.

Procedure

Questionnaire describing 52 events which causes mental stress was given to the subjects and they were asked to fill yes or no along with the level of control exercised by them over event. Level of control is assessed in three groups. Complete control, Partial control and no control.

Scoring

If the answer is 'yes' a score of one, two and three is assigned for complete control, partial control and no control respectively. If answer is 'no' then no score is assigned as the event does not bring any stress to the subject. The level is stress is arrived

taking into account of the score obtained by the subject. Lower the score is considered as less stress and vice versa

Norms

Level of Stress

- 0 -17 Mild Stress
- 18 - 35 Moderate stress
- 36 - 52 severe stress

Control Index

- 0-51 complete control over stress
- 52-105 Partial control over stress
- 106- 156 No control over stress.

3.12.3.2 ANXIETY

Purpose: The purpose of this test is to measure the Anxiety level of the subjects

Equipment : Anxiety Questionnaire developed by Tayler.(1952).

Procedure : The questionnaire administered in group setting and the subjects were seated comfortably. The researcher has explained about the questionnaire and made them to fill up the questionnaire.

The following instructions were given to the subjects. Questionnaire has 50 statements, each statement describe some personal experience. Each statement was evaluated on either true or false. The researcher requested them to read each statement carefully and decide to what extent each statement was true asked them to put tick mark at the appropriate option

Scoring: Scoring procedure for the positive statement:

If the answer is true for the positive statements, it gets '0' mark.

If the answer is false for the positive statements, it gets '1' mark.

Scoring procedure for the negative statement, marks are rewarded in the reverse. If the answer is true for the negative statements, it gets '1' mark.

If the answer is false for the negative statements, it gets '0' mark.

The maximum possible score is 50. Scores

Norms: Anxiety level

0-8 Normal anxiety

9-18 significantly anxious

19-30 highly anxious

31 and above Anxiety level in very high and uncontrollable.

3.12.3.3 SELF CONFIDENCE

Purpose: To assess the self confidence level of the subjects

Equipment: Rekha Agnihortry self-confidence questionnaire developed by Rekha Agnihortry (1987) consisting of 52 question.

Procedure: The subjects were asked to fill the questionnaire with two response alternatives viz., 'true' or 'false'. The questionnaire translated from English to Tamil so that subjects can understand.

Scoring: The questionnaire contains 56 statements. For each item, a score of one is assigned for a response indicative of lack self confidence. Hence, lower the score, higher would be the level self confidence and vice versa

Description: The inventory could be scored by hand. A score of one is awarded for a response indicative of lack of self confidence, that is for making cross(X) to wrong response to item numbers, 2,7,23,31,40,41,43,45,53,54,55, and for making cross (X) to right response to the rest of the items. The lower of the score the higher would be the level of confidence and vice versa.

3.13 COLLECTION OF DATA

To achieve the purpose of the study four groups consisting of 60 subjects each were selected at random. The experimental group – I, II, III were trained with Yoga practices, Therapeutic exercise practices and combined (yogic practices and therapeutic exercises) respectively for twelve weeks (5 days a week). After the training period all subjects were tested on selected criterion variables at different levels as pre and post training.

3.14 STATISTICAL TECHNIQUES

The data obtained were analyzed by Analysis of Covariance (ANCOVA) to assess the significant difference among the groups between the pre test and post test on clinical, physiological and psychological variables to find out the effects of Yoga practices, Therapeutic exercise and combined practices (yogic practices and therapeutic exercises) among Low back ache patients . The normality of the data collected was tested through F ratio (ANCOVA). The data and the regression were plotted and found to be in the standing straight line and thus tested for normality of data and found the data are normal. The investigator has analyzed scientific results obtained by application of various methodologies discussed above and the results are analyzed and presented in form of detailed discussion graphs and various tables in the next chapter.

CHAPTER - IV

RESULTS AND DISCUSSIONS

4.1 OVERVIEW

This chapter deals with the analysis of data collected from the subjects under the study. The purpose of this study was to find out the effect of yogic practices, Therapeutic exercise practices and combined practices on selected clinical, physiological and psychological variables among low backache men. For the low backache men were selected as subjects. Their age was ranging from 30 to 40 years. The subjects were selected into four groups. Experimental group I (yogic practices) Experimental group I (Therapeutic exercises), experimental group III combined (yogic practices & therapeutic exercises), and control group (no training). The subjects were analyzed with the differences in the measures of selected clinical, physiological and psychological variables such as pain, and cadence, range of motion, resting pulse rate, systolic blood pressure, respiratory rate stress, anxiety and self confidence only.

The subjects were selected randomly but the groups were not equated in relation to factors to be examined hence the difference between the means and four groups pre and post test were taken into an account during the analysis of covariance, where the final means were adjusted for difference in the initial means and the adjusted means were tested for significance difference. When the adjusted post test means were significant the Scheffe's post hoc test was administered to find out the paired means significant differences.

4.2 TEST OF SIGNIFICANCE

There could be the critical portion of the thesis in arriving at the conclusion by examining the hypothesis. This procedure of testing the hypothesis was done by accepting the research hypothesis or rejecting the same in accordance with the results in relation to the level of confidence fixed by 0.05 level of confidence.

4.3 LEVEL OF SIGNIFICANCE

The probability level below which the hypothesis is rejected is termed as the level of significance. The 'F' ratio obtained by analysis of covariance were compared at 0.05 level of significance. In analysis of covariance of 'F' ratio of 2.77 is needed for significance at the 0.05 level of confidence for the degrees freedom 3 and 56.

4.4 COMPUTATION OF ANALYSIS OF COVARIANCE AND SCHEFFE'S POST HOC TEST

The following tables illustrate the statistical result on the effect of yogic practices, Therapeutic exercise practices and combined practices on resting pulse rate, systolic blood pressure, respiratory rate, pain, cadence, range of motion, stress, anxiety and self-confidence only among low backache men. The ordered adjusted means and differences between the means of the groups under study were given in the following tables.

4.5 RESULTS ON RESTING PULSE RATE

The physiological variable resting pulse rate was measured through stethoscope and stopwatch. The results on the effect of yogic practices, Therapeutic exercise practices and combined practices on resting pulse rate among low backache men is presented in table XI.

TABLE XI

COMPUTATION OF ANALYSIS OF COVARIANCE OF PRE-TEST, POST-TEST AND ADJUSTED POST-TEST ON RESTING PULSE RATE OF YOGIC PRACTICES, THERAPEUTIC EXERCISE PRACTICES AND COMBINED PRACTICES

(Total Scores in Beats/min)

	EX.GR. I	EX.GR. II	EX.GR. III	Control	Source of Variance	Sum of Squares	df	Mean Squares	Obtained F
Pre Test Mean	78.40	79.60	79.07	78.93	between	10.93	3.00	3.64	1.24
					within	165.07	56.00	2.95	
Post Test Mean	76.40	76.53	74.27	79.20	between	183.73	3.00	61.24	9.15*
					within	374.67	56.00	6.69	
Adjusted Post Test Mean	76.32	76.61	74.28	79.19	between	182.90	3.00	60.97	9.02*
					within	371.66	55.00	6.76	
Mean Diff	2.00	3.07	4.80	0.27					

Table value at 0.05 level of confidence for 3 and 56 (df) is 2.77, 3 and 55 (df) is 2.77.

* Significant at 0.05 level.

Table XI shows that the pre test mean scores of Resting Pulse Rate Experimental group I –Yogic practices was 78.40. Experimental group II–Therapeutic exercise was 79.60; Experimental Group III Combined practices (Yogic practices and Therapeutic exercises) was 79.07 and control group was 78.93. The post test means showed differences due to Twelve weeks of Yogic practices, Therapeutic exercise practices and Combined (Yogic practices and Therapeutic exercises) and mean values recorded were 76.40, 76.53, 74.27 and 79.20 respectively.

The obtained F value on pre test scores 1.24 was lesser than the required F value of 2.77 to be significant at 0.05 level. This proved that there was no significant difference between the groups at initial stage and the randomization at the initial stage was equal.

The post test scores analysis proved that there was significant difference between the groups as the obtained F value at 9.15 was greater than the required F value of 2.77. This proved that the differences between the post test mean at the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value at 9.02 was greater than the required F value of 2.77. This proved that there was Significant differences among the means due to Twelve weeks of yogic practices, Therapeutic exercise and combined practices on the Physiological variable Resting pulse rate.

Since significant improvement were recorded. The results were subjected to post hoc analysis using Scheffe`s Confidence Interval test. The results were presented in table XII.

TABLE - XII

SCHEFFE'S POST-HOC TEST FOR RESTING PULSE RATE

Control Group	Experimental Group – I (Yogic practices)	Experimental Group – II (Therapeutic exercises)	Experimental Group – III (Combined Practices)	Mean Difference	CI
79.19	76.32			2.87*	2.03
79.19		76.61		2.58*	
79.19			74.28	4.92*	
	76.32	76.61		0.30	
	76.32		74.28	2.04*	
		76.61	74.28	2.34*	

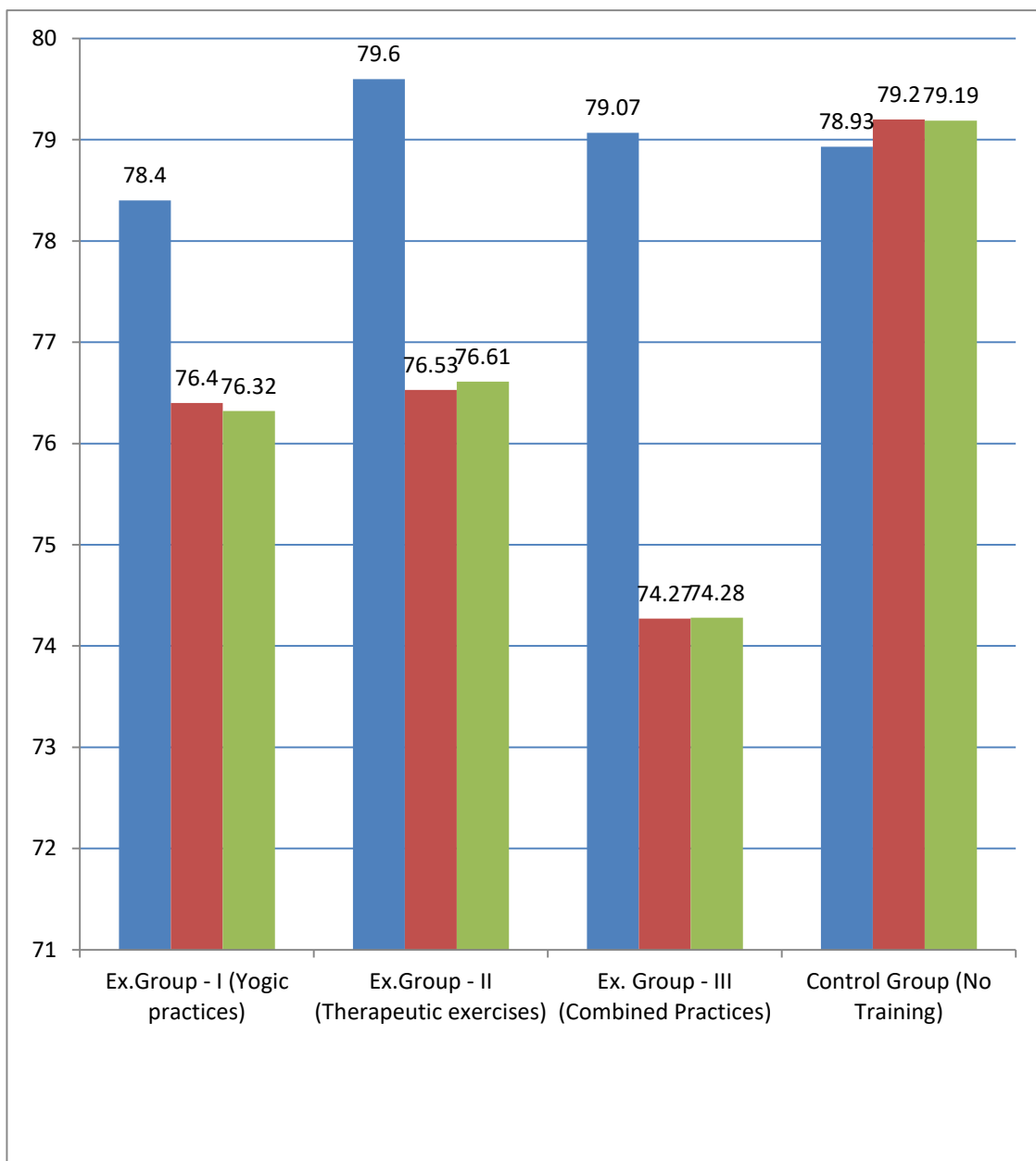
* Significant

Table- XII shows that there was significant difference between Yogic practices and control group and Therapeutic exercise group and control group, Combined practices (Yogic practices and Therapeutic exercises) group and control group.

The obtained adjusted mean values were presented through bar diagram in figure 29.

FIGURE - 29

**BAR DIAGRAM SHOWING PRE AND POST-TEST VALUES OF
EXPERIMENTAL GROUP I, II, III & CONTROL GROUP ON RESTING
PULSE RATE**



4.5.1 DISCUSSIONS ON THE FINDINGS OF RESTING PULSE RATE

The results presented in table XII showed that the obtained adjusted means on resting pulse rate among Yogic practices group was 76.32 followed by Therapeutic exercise group with the mean value of 76.61 followed by Combined practices group (Yogic practices and therapeutic exercises) mean value of 74.28 and control group mean value of 79.19. The difference among pre test scores Post test scores and adjusted mean scores of the subjects were statistically treated using ANCOVA and F values obtained were 1.24, 9.15 and 9.02 respectively. It was found that obtained F value on pre test score was not significant at 0.05 level of confidence as the obtained value was lesser than the required table value and post test Scores was significant at 0.05 level of confidence as the value was greater than the required table F value of 2.77.

The post hoc analysis through Scheffe`s confidence test proved that due to Twelve weeks treatment the Yogic practices group and Therapeutic exercise group and Combined practices group (Yogic practices and therapeutic exercises) there was significant improvement in resting pulse rate than control group and the differences were significant at 0.05 level. The post hoc analysis between the experimental group namely yogic practices group and Therapeutic exercise group and combined practices group (Yogic practices and therapeutic exercises) proved that there was significant difference.

The result of this study on resting pulse rate has in line with the study conducted by Sivasankaran S, et.al, (2008).

4.6. RESULTS ON SYSTOLIC BLOOD PRESSURE

The physiological variable Systolic blood pressure was measured through Citizens make digital portable blood Pressure monitor. The results on the effect of yogic practices, Therapeutic exercise and combined practices on Systolic blood pressure among low back-ache men is presented in table XIII.

TABLE XIII

COMPUTATION OF ANALYSIS OF COVARIANCE OF PRE-TEST, POST-TEST AND ADJUSTED POST-TEST ON SYSTOLIC BLOOD PRESSURE OF YOGIC PRACTICES, THERAPEUTIC EXERCISE PRACTICES AND COMBINED PRACTICES

(Total Scores in mm/hg)

	EX.GR. I	EX.GR. II	EX.GR. III	Control	Source of Variance	Sum of Squares	df	Mean Squares	Obtained F
Pre Test Mean	141.40	141.73	142.33	140.40	between	29.47	3.00	9.82	1.56
					within	353.47	56.00	6.31	
Post Test Mean	132.07	133.53	128.00	142.13	between	1591.33	3.00	530.44	43.79*
					within	678.40	56.00	12.11	
Adjusted Post Test Mean	132.06	133.54	128.03	142.10	between	1466.28	3.00	488.76	39.65*
					within	678.05	55.00	12.33	
Mean Diff	9.33	8.20	14.33	1.73					

Table value at 0.05 level of confidence for 3 and 56 (df) is 2.77, 3 and 55 (df) is 2.77.

* Significant at 0.05 level.

Table XIII shows that the pre test mean scores of Systolic blood pressure Experimental group I –Yogic practices was 141.40. Experimental group II–Therapeutic exercise was 141.73, Experimental group III Combined practices (Yogic practices and Therapeutic exercises) was 142.33 and control group was 140.40. The post test means showed differences due to Twelve weeks of Yogic practices, Therapeutic exercise and combined practices (Yogic practices and Therapeutic exercises) and mean values recorded were 132.07, 133.53, 128.00 and 142.13 respectively.

The obtained F value on pre test scores 1.56 was lesser than the required F value of 2.77 to be significant at 0.05 level. This proved that there was no significant difference between the groups at initial stage and the randomization at the initial stage was equal.

The post test scores analysis proved that there was significant difference between the groups as the obtained F value at 43.79 was greater than the required F value of 2.77. This proved that the differences between the post test mean at the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value at 39.65 was greater than the required F value of 2.77. This proved that there was Significant differences among the means due to Twelve weeks of yogic practices, Therapeutic exercise and combined practices on the Physiological variable systolic blood pressure.

Since significant improvement were recorded. The results were subjected to post hoc analysis using Scheffe`s Confidence Interval test. The results were presented in table XIV.

TABLE - XIV

SCHEFFE'S POST-HOC TEST FOR SYSTOLIC BLOOD PRESSURE

Control Group	Experimental Group – I (Yogic practices)	Experimental Group – II (Therapeutic exercises)	Experimental Group – III (Combined Practices)	Mean Difference	CI
142.10	132.06			10.04*	3.70
142.10		133.54		8.56*	
142.10			128.03	14.07*	
	132.06	133.54		1.48	
	132.06		128.03	4.04*	
		133.54	128.03	5.51*	

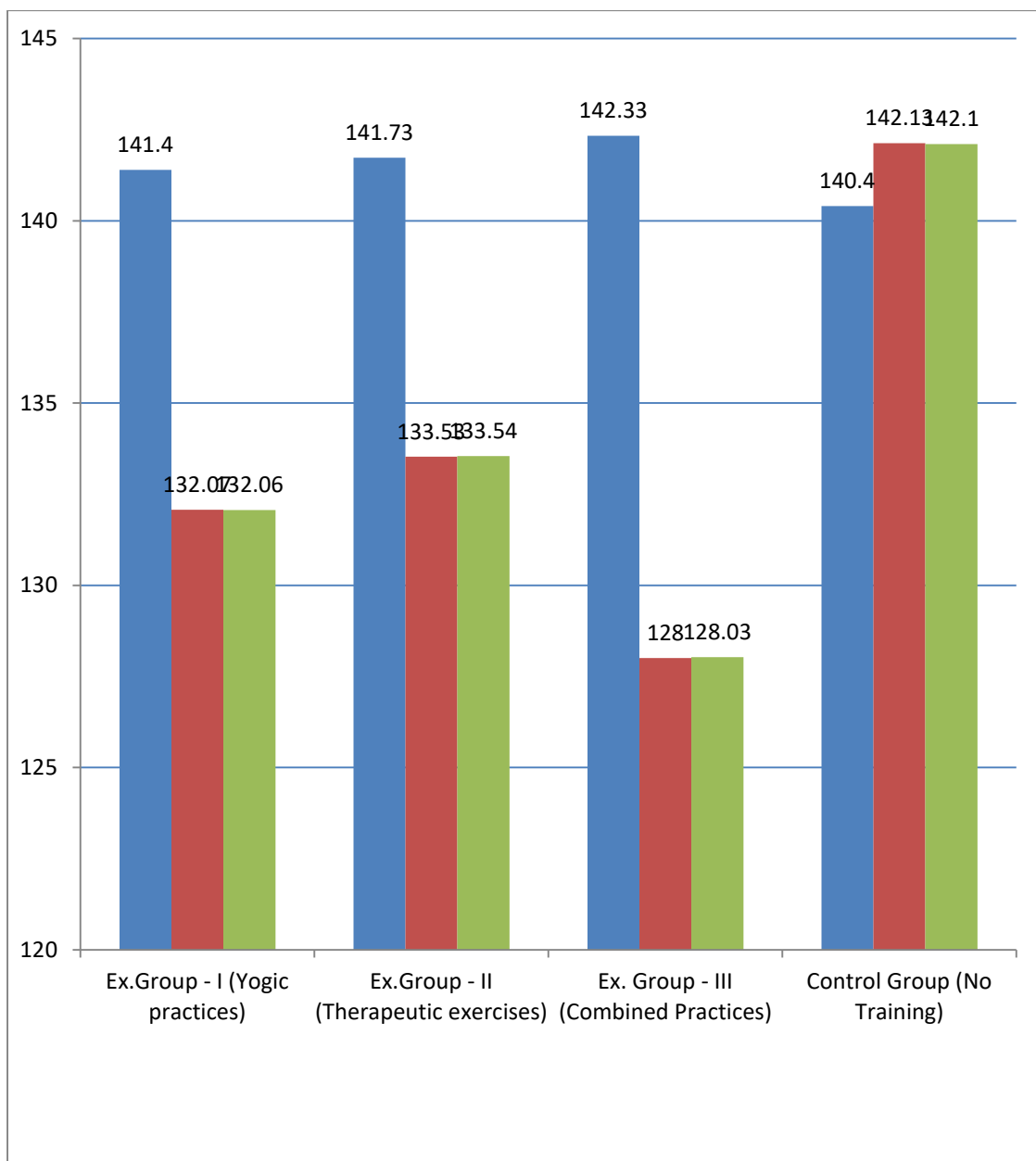
* Significant

Table - XIV shows that there was significant difference between Yogic practices and control group and Therapeutic exercise group and control group, combined practices (Yogic practices and Therapeutic exercises) group and control group.

The obtained adjusted mean values were presented through bar diagram in figure 30.

FIGURE - 30

**BAR DIAGRAM SHOWING PRE AND POST-TEST VALUES OF
EXPERIMENTAL GROUP I, II, III & CONTROL GROUP ON SYSTOLIC
BLOOD PRESSURE**



4.6.1 DISCUSSIONS ON THE FINDINGS OF SYSTOLIC BLOOD PRESSURE

The results presented in table XIV showed that the obtained adjusted means on Systolic blood pressure among Yogic practices group was 132.06 followed by Therapeutic exercise group with the mean value of 133.54 followed by Combined practices group (Yogic practices and therapeutic exercises) mean value of 128.03 and control group mean value of 142.10. The difference among pre test scores Post test scores and adjusted mean scores of the subjects were statistically treated using ANCOVA and F values obtained were 1.56, 43.79 and 39.65 respectively. It was found that obtained F value on pre test score was not significant at 0.05 level of confidence as the obtained value was lesser than the required table value and post test Scores was significant at 0.05 level of confidence as the value was greater than the required table F value of 2.77 .

The post hoc analysis through Scheffe`s confidence test proved that due to Twelve weeks treatment the Yogic practices group and Therapeutic exercise group and Combined practices group (Yogic practices and therapeutic exercises) there was significant improvement in Systolic blood pressure than control group and the differences were significant at 0.05 level. The post hoc analysis between the experimental group namely Yogic practices group and Therapeutic exercise group and Combined practices group (Yogic practices and therapeutic exercises) proved that there was significant difference.

The result of this study on Systolic blood pressure has in line with the study conducted by Saptharishi L, et.al, (2009).

4.7. RESULTS ON RESPIRATORY RATE

The physiological variable Respiratory rate was measured through standardized test. The results on the effect of yogic practices, Therapeutic exercise and combined practices on Respiratory rate among low backache men are presented in table XV.

TABLE XV

COMPUTATION OF ANALYSIS OF COVARIANCE OF PRE-TEST, POST-TEST AND ADJUSTED POST-TEST ON RESPIRATORY RATE OF YOGIC PRACTICES, THERAPEUTIC EXERCISE PRACTICES AND COMBINED PRACTICES

(Total Scores in no.s)

	EX.GR. I	EX.GR. II	EX.GR. III	Control	Source of Variance	Sum of Squares	df	Mean Squares	Obtained F
Pre Test Mean	20.53	20.13	21.00	20.47	between	5.73	3.00	1.91	0.69
					within	155.20	56.00	2.77	
Post Test Mean	19.27	18.73	16.80	21.87	between	196.33	3.00	65.44	28.19*
					within	130.00	56.00	2.32	
Adjusted Post Test Mean	19.27	18.74	16.79	21.87	between	195.30	3.00	65.10	27.56*
					within	129.93	55.00	2.36	
Mean Diff	1.27	1.40	4.20	1.40					

Table value at 0.05 level of confidence for 3 and 56 (df) is 2.77, 3 and 55 (df) is 2.77.

* Significant at 0.05 level.

Table XV shows that the pre test mean scores of Respiratory rate Experimental group I –Yogic practices was 20.53. Experimental group II–Therapeutic exercise was 20.13, Experimental group III Combined practices (Yogic practices and Therapeutic exercises) was 21.00 and control group was 20.47. The post test means showed differences due to Twelve weeks of Yogic practices, Therapeutic exercise and Combined practices (Yogic practices and Therapeutic exercises) and mean values recorded were 19.27, 18.73, 16.80 and 21.87 respectively.

The obtained F value on pre test scores 0.69 was lesser than the required F value of 2.77 to be significant at 0.05 level. This proved that there was no significant difference between the groups at initial stage and the randomization at the initial stage was equal.

The post test scores analysis proved that there was significant difference between the groups as the obtained F value at 28.19 was greater than the required F value of 2.77. This proved that the differences between the post test mean at the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value at 27.56 was greater than the required F value of 2.77. This proved that there was Significant differences among the means due to Twelve weeks of yogic practices, Therapeutic exercise and combined practices on the Physiological variable Respiratory rate.

Since significant improvement were recorded. The results were subjected to post hoc analysis using Scheffe`s Confidence Interval test. The results were presented in table XVI.

TABLE - XVI

SCHEFFE'S POST-HOC TEST FOR RESPIRATORY RATE

Control Group	Experimental Group – I (Yogic practices)	Experimental Group – II (Therapeutic exercises)	Experimental Group – III (Combined Practices)	Mean Difference	CI
21.87	19.27			2.60*	1.62
21.87		18.74		3.13*	
21.87			16.79	5.08*	
	19.27	18.74		0.52	
	19.27		16.79	2.48*	
		18.74	16.79	1.95*	

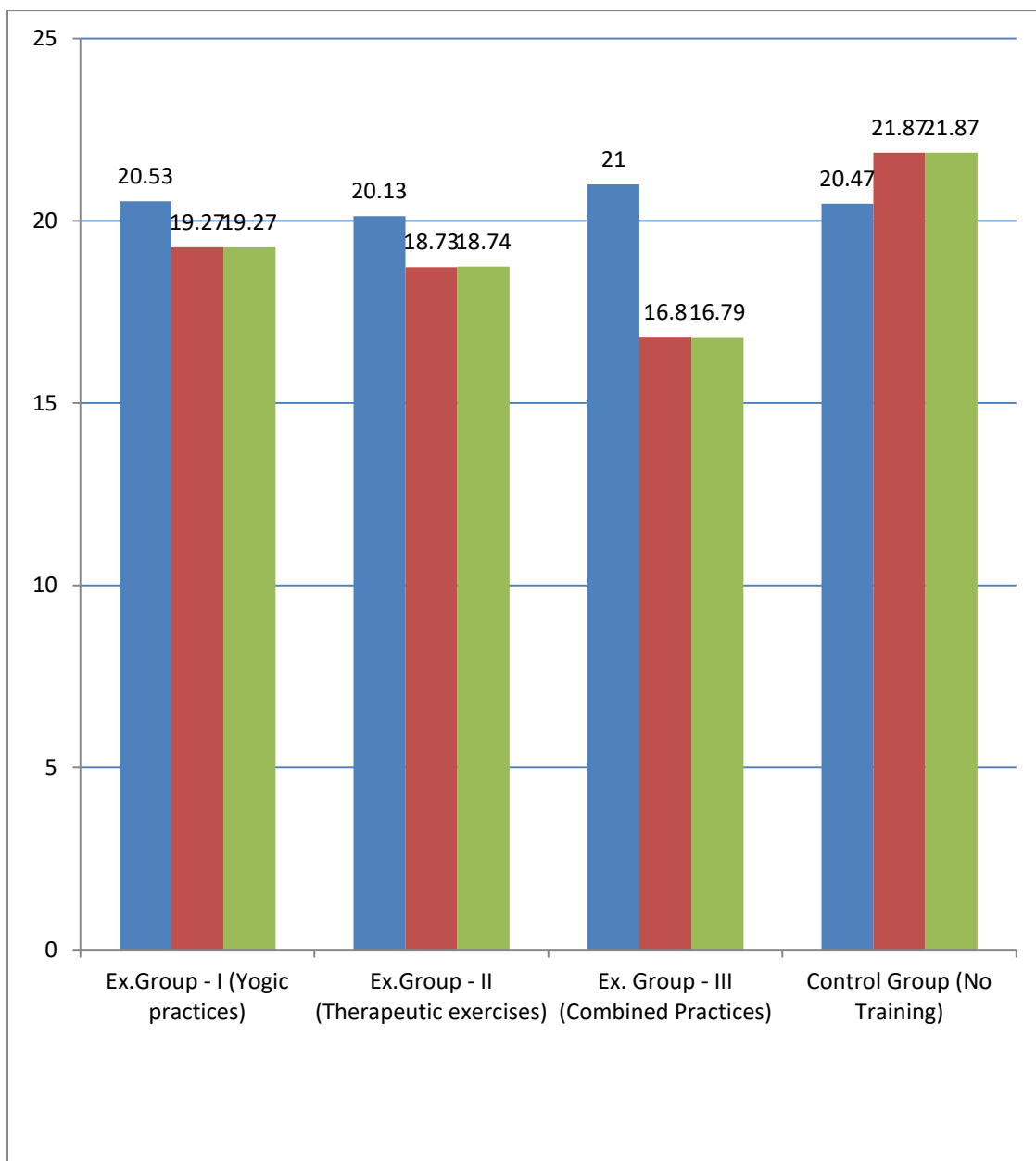
* Significant

Table - XVI shows that there was significant difference between Yogic practices and control group and Therapeutic exercise group and control group, combined practices (Yogic practices and Therapeutic exercises) group and control group.

The obtained adjusted mean values were presented through bar diagram in figure 31.

FIGURE - 31

**BAR DIAGRAM SHOWING PRE AND POST-TEST VALUES OF
EXPERIMENTAL GROUP I, II, III & CONTROL GROUP ON RESPIRATORY
RATE**



4.7.1 DISCUSSIONS ON THE FINDINGS OF RESPIRATORY RATE

The results presented in table XVI showed that the obtained adjusted means on Respiratory rate among Yogic practices group was 19.27 followed by Therapeutic exercise group with the mean value of 18.74 followed by Combined practices group (Yogic practices and therapeutic exercises) mean value of 16.79 and control group mean value of 21.87. The difference among pre test scores Post test scores and adjusted mean scores of the subjects were statistically treated using ANCOVA and F values obtained were 0.69, 28.19 and 27.56 respectively. It was found that obtained F value on pre test score was not significant at 0.05 level of confidence as the obtained value was lesser than the required table value and post test Scores was significant at 0.05 level of confidence as the value was greater than the required table F value of 2.77 .

The post hoc analysis through Scheffe`s confidence test proved that due to Twelve weeks treatment the Yogic practices group and Therapeutic exercise group and Combined practices group (Yogic practices and therapeutic exercises) there was significant improvement in Respiratory rate than control group and the differences were significant at 0.05 level. The post hoc analysis between the experimental group namely yogic practices group and Therapeutic exercise group and combined practices group (Yogic practices and therapeutic exercises) proved that there was significant difference.

The result of this study on Respiratory rate has in line with the study conducted by Dvivedi J, et.al, (2008).

4.8. RESULTS ON PAIN

The clinical variable pain was measured through Visual Analogue Scale (VAS).

The results on the effect of yogic practices, Therapeutic exercise and combined practices on Pain among low back ache men is presented in table XVII.

TABLE XVII

COMPUTATION OF ANALYSIS OF COVARIANCE OF PRE-TEST, POST-TEST AND ADJUSTED POST-TEST ON PAIN OF YOGIC PRACTICES, THERAPEUTIC EXERCISE PRACTICES AND COMBINED PRACTICES

(Total Scores in no.s)

	EX.GR. I	EX.GR. II	EX.GR. III	Control	Source of Variance	Sum of Squares	df	Mean Squares	Obtained F
Pre Test Mean	7.60	7.07	6.80	7.73	between	8.73	3.00	2.91	1.81
					within	89.87	56.00	1.60	
Post Test Mean	5.47	5.20	3.73	7.40	between	102.18	3.00	34.06	27.78*
					within	68.67	56.00	1.23	
Adjusted Post Test Mean	5.40	5.25	3.84	7.31	between	85.00	3.00	28.33	24.17*
					within	64.48	55.00	1.17	
Mean Diff	2.13	1.87	3.07	0.33					

Table value at 0.05 level of confidence for 3 and 56 (df) is 2.77, 3 and 55 (df) is 2.77.

* Significant at 0.05 level.

Table XVII shows that the pre test mean scores of Pain Experimental group I - Yogic practices was 7.60. Experimental group II - Therapeutic exercise was 7.07, Experimental group III - Combined practices (Yogic practices and Therapeutic exercises) was 6.80 and control group was 7.73. The post test means showed differences due to Twelve weeks of Yogic practices, Therapeutic exercise and combined practices (Yogic practices and Therapeutic exercises) and mean values recorded were 5.47, 5.20, 3.73 and 7.40 respectively.

The obtained F value on pre test scores 1.81 was lesser than the required F value of 2.77 to be significant at 0.05 level. This proved that there was no significant difference between the groups at initial stage and the randomization at the initial stage was equal.

The post test scores analysis proved that there was significant difference between the groups as the obtained F value at 27.78 was greater than the required F value of 2.77. This proved that the differences between the post test mean at the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value at 24.17 was greater than the required F value of 2.77. This proved that there was Significant differences among the means due to Twelve weeks of yogic practices, Therapeutic exercise and combined practices on the Clinical variable Pain.

Since significant improvement were recorded. The results were subjected to post hoc analysis using Scheffe's Confidence Interval test. The results were presented in table XVIII.

TABLE - XVIII

SCHEFFE'S POST-HOC TEST FOR PAIN

Control Group	Experimental Group – I (Yogic practices)	Experimental Group – II (Therapeutic exercises)	Experimental Group – III (Combined Practices)	Mean Difference	CI
7.31	5.40			1.90*	1.14
7.31		5.25		2.06*	
7.31			3.84	3.47*	
	5.40	5.25		0.15	
	5.40		3.84	1.56*	
		5.25	3.84	1.41*	

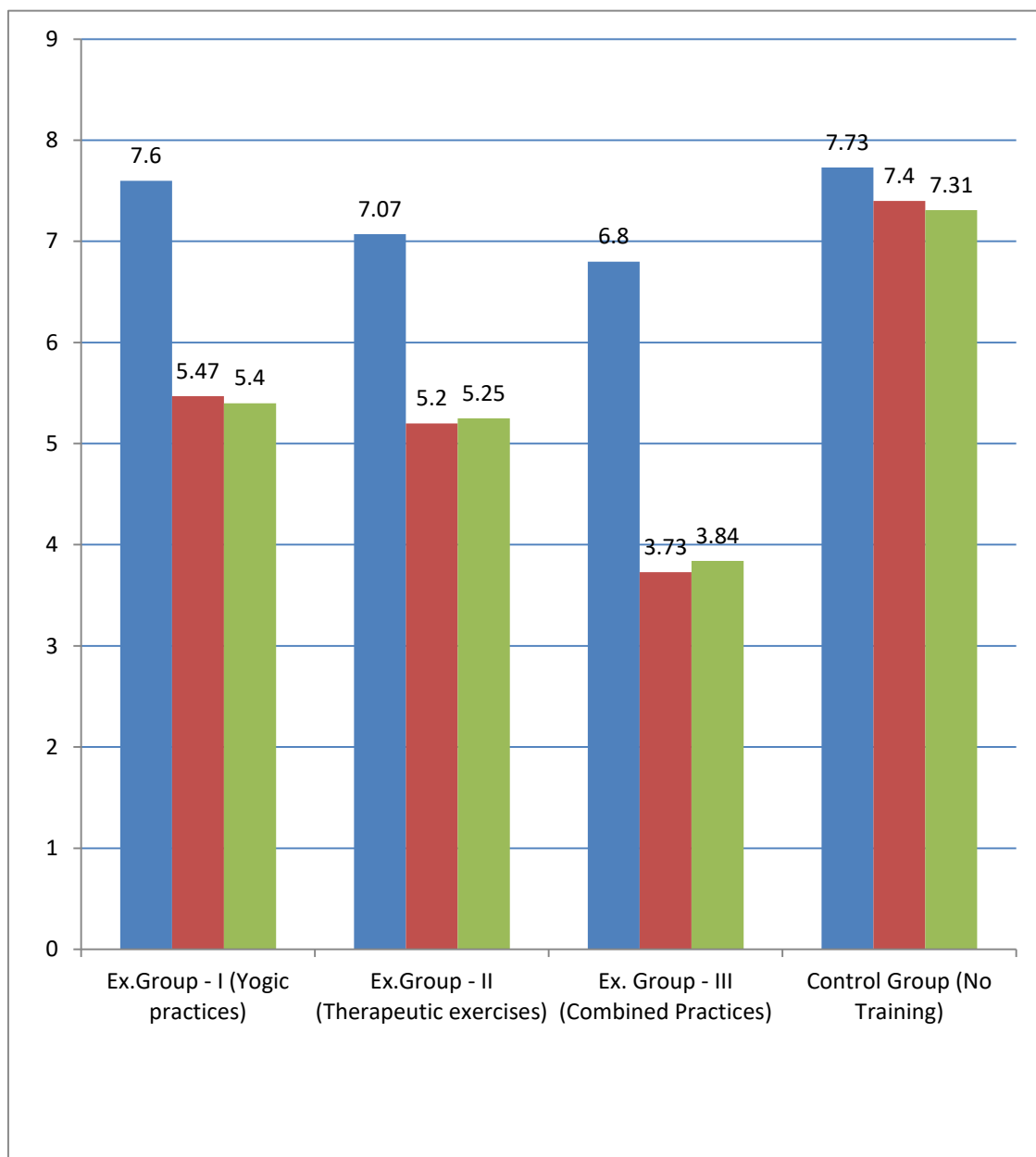
* Significant

Table - XVIII shows that there was significant difference between Yogic practices and control group and Therapeutic exercise group and control group, combined practices (Yogic practices and Therapeutic exercises) group and control group.

The obtained adjusted mean values were presented through bar diagram in figure 32.

FIGURE - 32

**BAR DIAGRAM SHOWING PRE AND POST-TEST VALUES OF
EXPERIMENTAL GROUP I, II, III & CONTROL GROUP ON PAIN**



4.8.1 DISCUSSIONS ON THE FINDINGS OF PAIN

The results presented in table XVIII showed that the obtained adjusted means on Pain among Yogic practices group was 5.40 followed by Therapeutic exercise group with the mean value of 5.25 followed by Combined practices group (Yogic practices and therapeutic exercises) mean value of 3.84 and control group mean value of 7.31. The difference among pre test scores Post test scores and adjusted mean scores of the subjects were statistically treated using ANCOVA and F values obtained were 1.81, 27.78 and 24.17 respectively. It was found that obtained F value on pre test score was not significant at 0.05 level of confidence as the obtained value was lesser than the required table value and post test Scores was significant at 0.05 level of confidence as the value was greater than the required table F value of 2.77.

The post hoc analysis through Scheffe's confidence test proved that due to Twelve weeks treatment the Yogic practices group and Therapeutic exercise practices group and Combined group (Yogic practices and therapeutic exercises) there was significant improvement in Pain than control group and the differences were significant at 0.05 level. The post hoc analysis between the experimental group namely yogic practices group and Therapeutic exercise group and combined practices group (Yogic practices and therapeutic exercises) proved that there was significant difference.

The result of this study on Pain has in line with the study conducted by Weiss HR and Werkmann(1998) .

4.9. RESULTS ON CADENCE

The clinical variable Cadence was measured through Stopwatch, paper and pencil. The results on the effect of yogic practices, Therapeutic exercise and combined practices on Cadence among low backache men is presented in table XIX.

TABLE XIX

COMPUTATION OF ANALYSIS OF COVARIANCE OF PRE-TEST, POST-TEST AND ADJUSTED POST-TEST ON CADENCE OF YOGIC PRACTICES, THERAPEUTIC EXERCISE PRACTICES AND COMBINED PRACTICES

(Total Scores in No of steps/min)

	EX.GR. I	EX.GR. II	EX.GR. III	Control	Source of Variance	Sum of Squares	df	Mean Squares	Obtained F
Pre Test Mean	72.53	69.67	67.07	74.53	between	481.12	3.00	160.37	1.91
					within	4703.73	56.00	84.00	
Post Test Mean	90.80	84.33	100.60	77.73	between	4273.67	3.00	1424.56	11.19*
					within	7130.27	56.00	127.33	
Adjusted Post Test Mean	89.38	85.49	104.09	74.51	between	6245.73	3.00	2081.91	34.40*
					within	3328.45	55.00	60.52	
Mean Diff	18.27	14.67	33.53	3.20					

Table value at 0.05 level of confidence for 3 and 56 (df) is 2.77, 3 and 55 (df) is 2.77.

* Significant at 0.05 level.

Table XIX shows that the pre test mean scores of Cadence Experimental group I –Yogic practices was 72.53. Experimental group II–Therapeutic exercise was 69.67, Experimental Group III Combined practices (Yogic practices and Therapeutic exercises) was 67.07 and control group was 74.53. The post test means showed differences due to Twelve weeks of Yogic practices, Therapeutic exercise practices and Combined (Yogic practices and Therapeutic exercises) and mean values recorded were 90.80, 84.33, 100.60 and 77.73 respectively.

The obtained F value on pre test scores 1.91 was lesser than the required F value of 2.77 to be significant at 0.05 level. This proved that there was no significant difference between the groups at initial stage and the randomization at the initial stage was equal.

The post test scores analysis proved that there was significant difference between the groups as the obtained F value at 11.19 was greater than the required F value of 2.77. This proved that the differences between the post test mean at the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value at 34.40 was greater than the required F value of 2.77. This proved that there was Significant differences among the means due to Twelve weeks of yogic practices, Therapeutic exercise and combined practices on the clinical variable Cadence.

Since significant improvement were recorded. The results were subjected to post hoc analysis using Scheffe`s Confidence Interval test. The results were presented in table XX.

TABLE - XX
SCHEFFE'S POST-HOC TEST FOR CADENCE

Control Group	Experimental Group – I (Yogic practices)	Experimental Group – II (Therapeutic exercises)	Experimental Group – III (Combined Practices)	Mean Difference	CI
74.51	89.38			14.86*	8.20
74.51		85.49		10.98*	
74.51			104.09	29.58*	
	89.38	85.49		3.89	
	89.38		104.09	14.71*	
		85.49	104.09	18.60*	

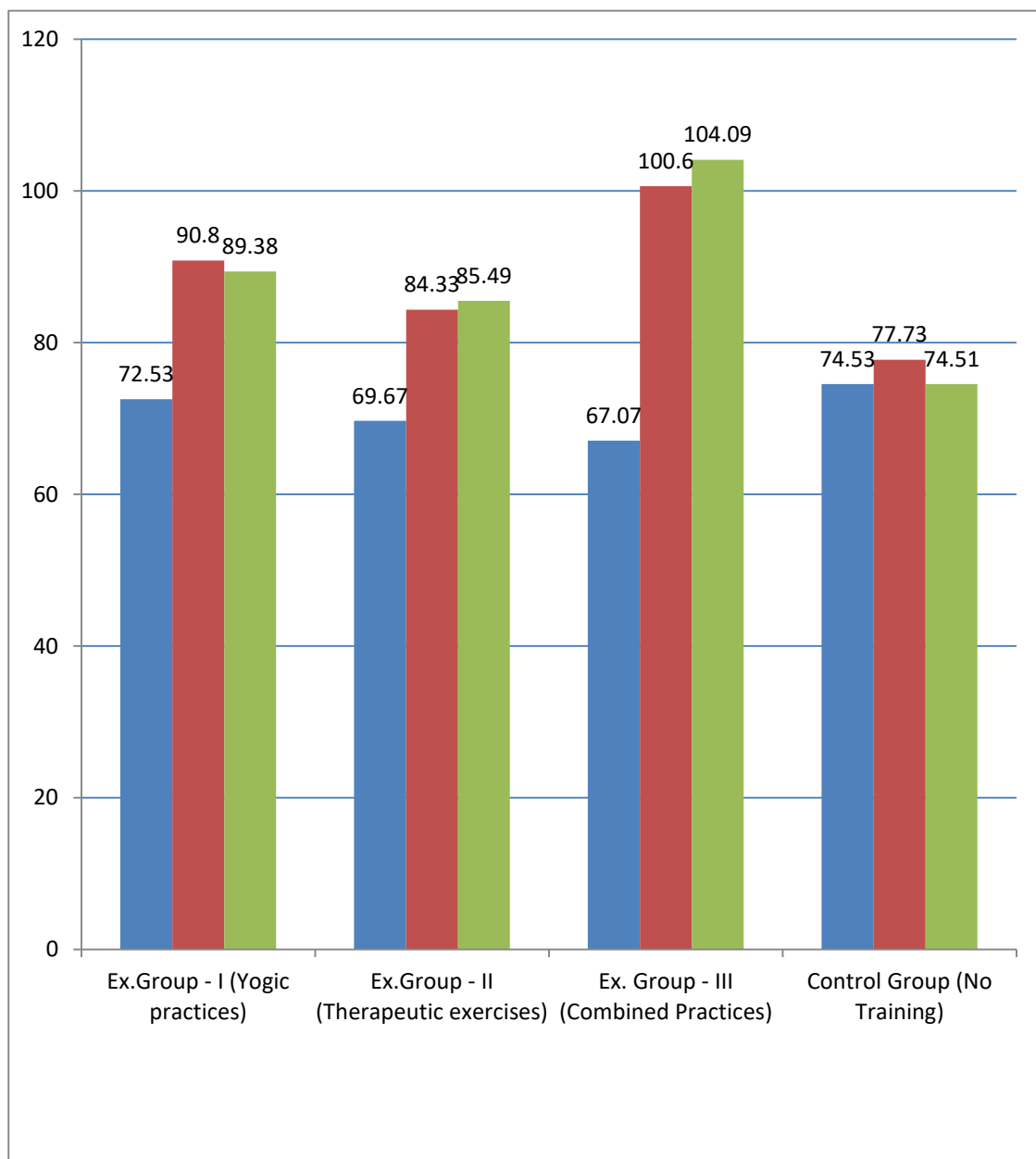
* Significant

Table - XX shows that there was significant difference between Yogic practices and control group and Therapeutic exercise group and control group, Combined practices (Yogic practices and Therapeutic exercises) group and control group.

The obtained adjusted mean values were presented through bar diagram in figure 33.

FIGURE - 33

**BAR DIAGRAM SHOWING PRE AND POST-TEST VALUES OF
EXPERIMENTAL GROUP I, II, III & CONTROL GROUP ON CADENCE**



4.9.1 DISCUSSIONS ON THE FINDINGS OF CADENCE

The results presented in table XX showed that the obtained adjusted means on Cadence among Yogic practices group was 89.38 followed by Therapeutic exercise group with the mean value of 85.49 followed by Combined practices group (Yogic practices and therapeutic exercises) mean value of 104.09 and control group mean value of 74.51. The difference among pre test scores Post test scores and adjusted mean scores of the subjects were statistically treated using ANCOVA and F values obtained were 1.91, 11.19 and 34.40 respectively. It was found that obtained F value on pre test score was not significant at 0.05 level of confidence as the obtained value was lesser than the required table value and post test Scores was significant at 0.05 level of confidence as the value was greater than the required table F value of 2.77 .

The post hoc analysis through Scheffe`s confidence test proved that due to Twelve weeks treatment the Yogic practices group and Therapeutic exercise practices group and Combined group (Yogic practices and therapeutic exercises) there was significant improvement in Cadence than control group and the differences were significant at 0.05 level. The post hoc analysis between the experimental group namely Yogic practices group and Therapeutic exercise group and Combined practices group (Yogic practices and therapeutic exercises) proved that there was significant difference.

The result of this study on Cadence has in line with the study conducted by Nagendra H R.

4.10. RESULTS ON RANGE OF MOTION

The clinical variable Range of motion was measured through Goniometer. The results on the effect of yogic practices, Therapeutic exercise and combined practices on Range of motion among low backache men is presented in table XXI.

TABLE XXI

COMPUTATION OF ANALYSIS OF COVARIANCE OF PRE-TEST, POST-TEST AND ADJUSTED POST-TEST ON RANGE OF MOTION OF YOGIC PRACTICES, THERAPEUTIC EXERCISE PRACTICES AND COMBINED PRACTICES

(Total Scores in Degrees)

	EX.GR. I	EX.GR. II	EX.GR. III	Control	Source of Variance	Sum of Squares	df	Mean Squares	Obtained F
Pre Test Mean	82.47	84.00	81.27	87.33	between	310.73	3.00	103.58	0.60
					within	9730.00	56.00	173.75	
Post Test Mean	96.53	99.67	109.53	84.40	between	4830.53	3.00	1610.18	21.60*
					within	4174.40	56.00	74.54	
Adjusted Post Test Mean	96.72	99.63	109.90	83.88	between	5027.31	3.00	1675.77	23.22*
					within	3969.45	55.00	72.17	
Mean Diff	14.07	15.67	28.27	2.93					

Table value at 0.05 level of confidence for 3 and 56 (df) is 2.77, 3 and 55 (df) is 2.77.

* Significant at 0.05 level.

Table XXI shows that the pre test mean scores of Range of motion Experimental group I –Yogic practices was 82.47. Experimental group II–Therapeutic exercise was 84.00, Experimental group III - Combined practices (Yogic practices and Therapeutic exercises) was 81.27 and control group was 87.33. The post test means showed differences due to Twelve weeks of Yogic practices, Therapeutic exercise and combined practices (Yogic practices and Therapeutic exercises) and mean values recorded were 96.53, 99.67, 109.53 and 84.40 respectively.

The obtained F value on pre test scores 0.60 was lesser than the required F value of 2.77 to be significant at 0.05 level. This proved that there was no significant difference between the groups at initial stage and the randomization at the initial stage was equal.

The post test scores analysis proved that there was significant difference between the groups as the obtained F value at 21.60 was greater than the required F value of 2.77. This proved that the differences between the post test mean at the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value at 23.22 was greater than the required F value of 2.77. This proved that there was Significant differences among the means due to Twelve weeks of yogic practices, Therapeutic exercise and combined practices on the Clinical variable Range of motion.

Since significant improvement were recorded. The results were subjected to post hoc analysis using Scheffe`s Confidence Interval test. The results were presented in table XXII.

TABLE - XXII

SCHEFFE'S POST-HOC TEST FOR RANGE OF MOTION

Control Group	Experimental Group – I (Yogic practices)	Experimental Group – II (Therapeutic exercises)	Experimental Group – III (Combined Practices)	Mean Difference	CI
83.88	96.72			12.84*	8.96
83.88		99.63		15.75*	
83.88			109.90	26.01*	
	96.72	99.63		2.91	
	96.72		109.90	13.17*	
		99.63	109.90	10.26*	

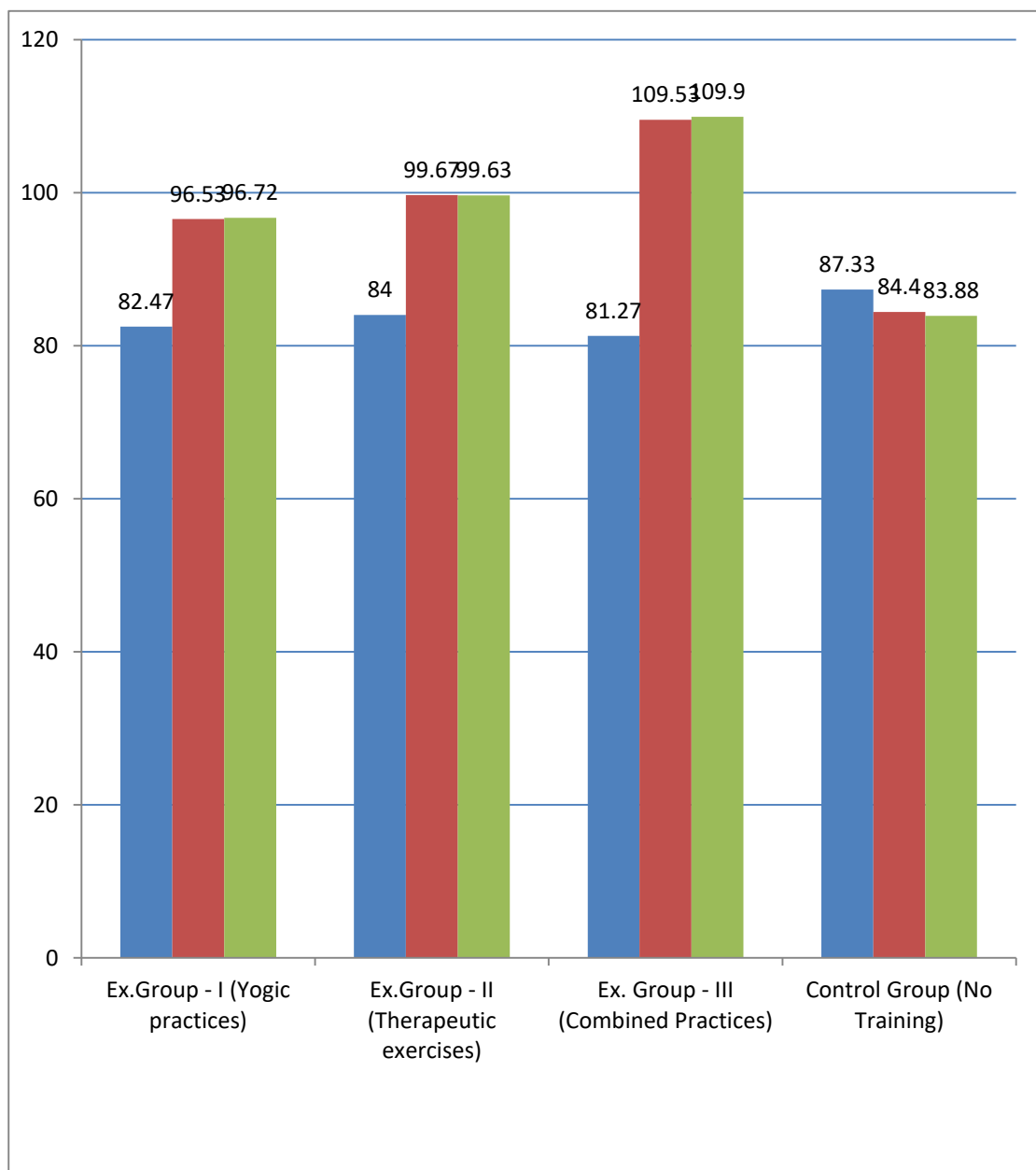
* Significant

Table - XXII shows that there was significant difference between Yogic practices and control group and Therapeutic exercise group and control group, Combined practices (Yogic practices and Therapeutic exercises) group and control group.

The obtained adjusted mean values were presented through bar diagram in figure 34.

FIGURE - 34

**BAR DIAGRAM SHOWING PRE AND POST-TEST VALUES OF
EXPERIMENTAL GROUP I, II, III & CONTROL GROUP ON RANGE OF
MOTION**



4.10.1 DISCUSSIONS ON THE FINDINGS OF RANGE OF MOTION

The results presented in table XXII showed that the obtained adjusted means on Range of motion among Yogic practices group was 96.72 followed by Therapeutic exercise group with the mean value of 99.63 followed by Combined practices group (Yogic practices and therapeutic exercises) mean value of 109.90 and control group mean value of 83.88. The difference among pre test scores Post test scores and adjusted mean scores of the subjects were statistically treated using ANCOVA and F values obtained were 0.60, 21.60 and 23.22 respectively. It was found that obtained F value on pre test score was not significant at 0.05 level of confidence as the obtained value was lesser than the required table value and post test Scores was significant at 0.05 level of confidence as the value was greater than the required table F value of 2.77.

The post hoc analysis through Scheffe`s confidence test proved that due to Twelve weeks treatment the Yogic practices group and Therapeutic exercise group and Combined practices group (Yogic practices and therapeutic exercises) there was significant improvement in Range of motion than control group and the differences were significant at 0.05 level. The post hoc analysis between the experimental group namely Yogic practices group and Therapeutic exercise group and Combined practices group (Yogic practices and therapeutic exercises) proved that there was significant difference.

The result of this study on Range of motion has in line with the study conducted by Weiner and Perera (1998).

4.11. RESULTS ON STRESS

The psychological variable Stress was measured through Dr.Latha sathish Questionnaire. The results on the effect of yogic practices, Therapeutic exercise and combined practices on Stress among low backache men is presented in table XXIII.

TABLE XXIII

COMPUTATION OF ANALYSIS OF COVARIANCE OF PRE-TEST, POST-TEST AND ADJUSTED POST-TEST ON STRESS OF YOGIC PRACTICES, THERAPEUTIC EXERCISE PRACTICES AND COMBINED PRACTICES

(Total Scores in marks)

	EX.GR. I	EX.GR. II	EX.GR. III	Control	Source of Variance	Sum of Squares	df	Mean Squares	Obtained F
Pre Test Mean	80.20	84.73	82.60	79.27	between	272.73	3.00	90.91	0.21
					within	24221.87	56.00	432.53	
Post Test Mean	67.53	72.13	54.40	81.00	between	5533.67	3.00	1844.56	4.85*
					within	21307.07	56.00	380.48	
Adjusted Post Test Mean	68.49	70.21	53.83	82.55	between	6211.70	3.00	2070.57	9.89*
					within	11520.58	55.00	209.47	
Mean Diff	12.67	12.60	28.20	1.73					

Table value at 0.05 level of confidence for 3 and 56 (df) is 2.77, 3 and 55 (df) is 2.77.

* Significant at 0.05 level.

Table XXIII shows that the pre test mean scores of Stress Experimental group I –Yogic practices was 80.20. Experimental group II–Therapeutic exercise was 84.73, Experimental group III - Combined practices (Yogic practices and Therapeutic exercises) was 82.60 and control group was 79.27. The post test means showed differences due to Twelve weeks of Yogic practices, Therapeutic exercise and combined practices (Yogic practices and Therapeutic exercises) and mean values recorded were 67.53, 72.13, 54.40 and 81.00 respectively.

The obtained F value on pre test scores 0.21 was lesser than the required F value of 2.77 to be significant at 0.05 level. This proved that there was no significant difference between the groups at initial stage and the randomization at the initial stage was equal.

The post test scores analysis proved that there was significant difference between the groups as the obtained F value at 4.85 was greater than the required F value of 2.77. This proved that the differences between the post test mean at the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value at 9.89 was greater than the required F value of 2.77. This proved that there was Significant differences among the means due to Twelve weeks of yogic practices, Therapeutic exercises and combined practices on the Psychological variable stress.

Since significant improvement were recorded, the results were subjected to post hoc analysis using Scheffe`s Confidence Interval test. The results were presented in table XXIV.

TABLE - XXIV
SCHEFFE'S POST-HOC TEST FOR STRESS

Control Group	Experimental Group – I (Yogic practices)	Experimental Group – II (Therapeutic exercises)	Experimental Group – III (Combined Practices)	Mean Difference	CI
82.55	68.49			14.06*	12.26
82.55		70.21		12.34*	
82.55			53.83	28.72*	
	68.49	70.21		1.72	
	68.49		53.83	14.66*	
		70.21	53.83	16.38*	

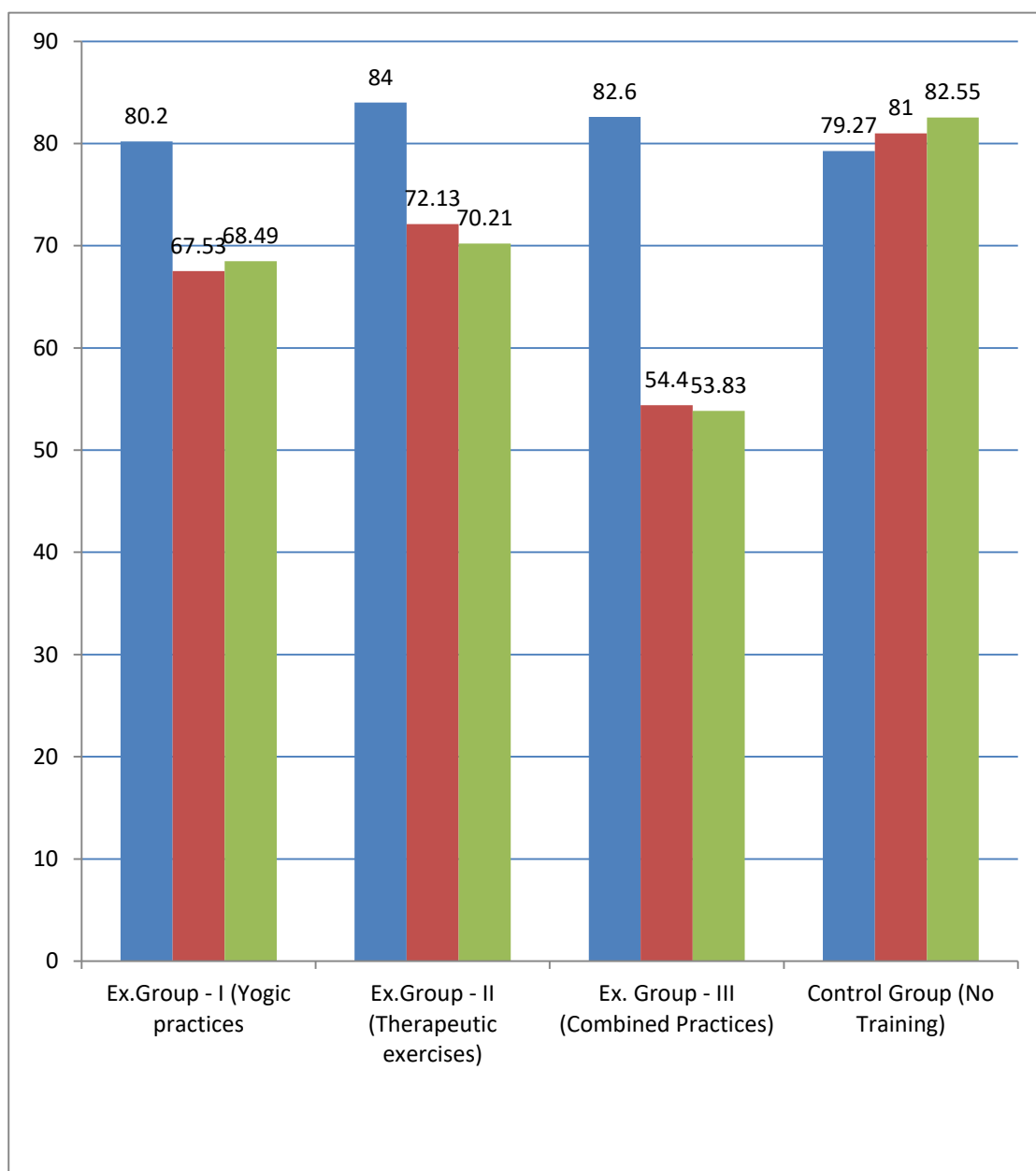
* Significant

Table - XXIV shows that there was significant difference between Yogic practices and control group and Therapeutic exercise group and control group, Combined practices (Yogic practices and Therapeutic exercises) group and control group.

The obtained adjusted mean values were presented through bar diagram in figure 35.

FIGURE - 35

**BAR DIAGRAM SHOWING PRE AND POST-TEST VALUES OF
EXPERIMENTAL GROUP I, II, III & CONTROL GROUP ON STRESS**



4.11.1 DISCUSSIONS ON THE FINDINGS OF STRESS

The results presented in table XXIV showed that the obtained adjusted means on Stress among Yogic practices group was 68.49 followed by Therapeutic exercise group with the mean value of 70.21 followed by Combined practices group (Yogic practices and therapeutic exercises) mean value of 53.83 and control group mean value of 82.55. The difference among pre test scores Post test scores and adjusted mean scores of the subjects were statistically treated using ANCOVA and F values obtained were 0.21, 4.85 and 9.89 respectively. It was found that obtained F value on pre test score was not significant at 0.05 level of confidence as the obtained value was lesser than the required table value and post test Scores was significant at 0.05 level of confidence as the value was greater than the required table F value of 2.77.

The post hoc analysis through Scheffe`s confidence test proved that due to Twelve weeks treatment the Yogic practices group and Therapeutic exercise group and Combined practices group (Yogic practices and therapeutic exercises) there was significant improvement in Stress than control group and the differences were significant at 0.05 level. The post hoc analysis between the experimental group namely Yogic practices group and Therapeutic exercise group and Combined practices group (Yogic practices and therapeutic exercises) proved that there was significant difference.

The result of this study on Stress has in line with the study conducted by Yadav RK, et.al, (2005) .

4.12. RESULTS ON ANXIETY

The psychological variable Anxiety was measured through Tayler.(1952) Questionnaire. The results on the effect of yogic practices, Therapeutic exercise and combined practices on Anxiety among low backache men is presented in table XXV.

TABLE XXV

COMPUTATION OF ANALYSIS OF COVARIANCE OF PRE-TEST, POST-TEST AND ADJUSTED POST-TEST ON ANXIETY OF YOGIC PRACTICES, THERAPEUTIC EXERCISE PRACTICES AND COMBINED PRACTICES

(Total Scores in marks)

	EX.GR. I	EX.GR. II	EX.GR. III	Control	Source of Variance	Sum of Squares	df	Mean Squares	Obtained F
Pre Test Mean	35.47	35.40	36.60	33.27	between	87.12	3.00	29.04	1.21
					within	1345.87	56.00	24.03	
Post Test Mean	23.33	22.80	17.13	35.00	between	2531.27	3.00	843.76	26.14*
					within	1807.47	56.00	32.28	
Adjusted Post Test Mean	23.28	22.76	16.86	35.37	between	2549.46	3.00	849.82	26.59*
					within	1758.14	55.00	31.97	
Mean Diff	12.13	12.60	19.47	1.73					

Table value at 0.05 level of confidence for 3 and 56 (df) is 2.77, 3 and 55 (df) is 2.77.

* Significant at 0.05 level.

Table XXV shows that the pretest mean scores of Anxiety Experimental group I –Yogic practices was 35.47. Experimental group II–Therapeutic exercise was 35.40, Experimental group III - Combined practices (Yogic practices and Therapeutic exercises) was 36.60 and control group was 33.27. The post test means showed differences due to Twelve weeks of Yogic practices, Therapeutic exercise and combined practices (Yogic practices and Therapeutic exercises) and mean values recorded were 23.33, 22.80, 17.13 and 35.00 respectively.

The obtained F value on pre test scores 1.21 was lesser than the required F value of 2.77 to be significant at 0.05 level. This proved that there was no significant difference between the groups at initial stage and the randomization at the initial stage was equal.

The post test scores analysis proved that there was significant difference between the groups as the obtained F value at 26.14 was greater than the required F value of 2.77. This proved that the differences between the post test mean at the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value at 26.59 was greater than the required F value of 2.77. This proved that there was Significant differences among the means due to Twelve weeks of yogic practices, Therapeutic exercise and combined practices on the Psychological variable anxiety.

Since significant improvement were recorded, the results were subjected to post hoc analysis using Scheffe`s Confidence Interval test. The results were presented in table XXVI.

TABLE - XXVI

SCHEFFE'S POST-HOC TEST FOR ANXIETY

Control Group	Experimental Group – I (Yogic practices)	Experimental Group – II (Therapeutic exercises)	Experimental Group – III (Combined Practices)	Mean Difference	CI
35.37	23.28			12.09*	5.86
35.37		22.76		12.61*	
35.37			16.86	18.50*	
	23.28	22.76		0.52	
	23.28		16.86	6.42*	
		22.76	16.86	5.90*	

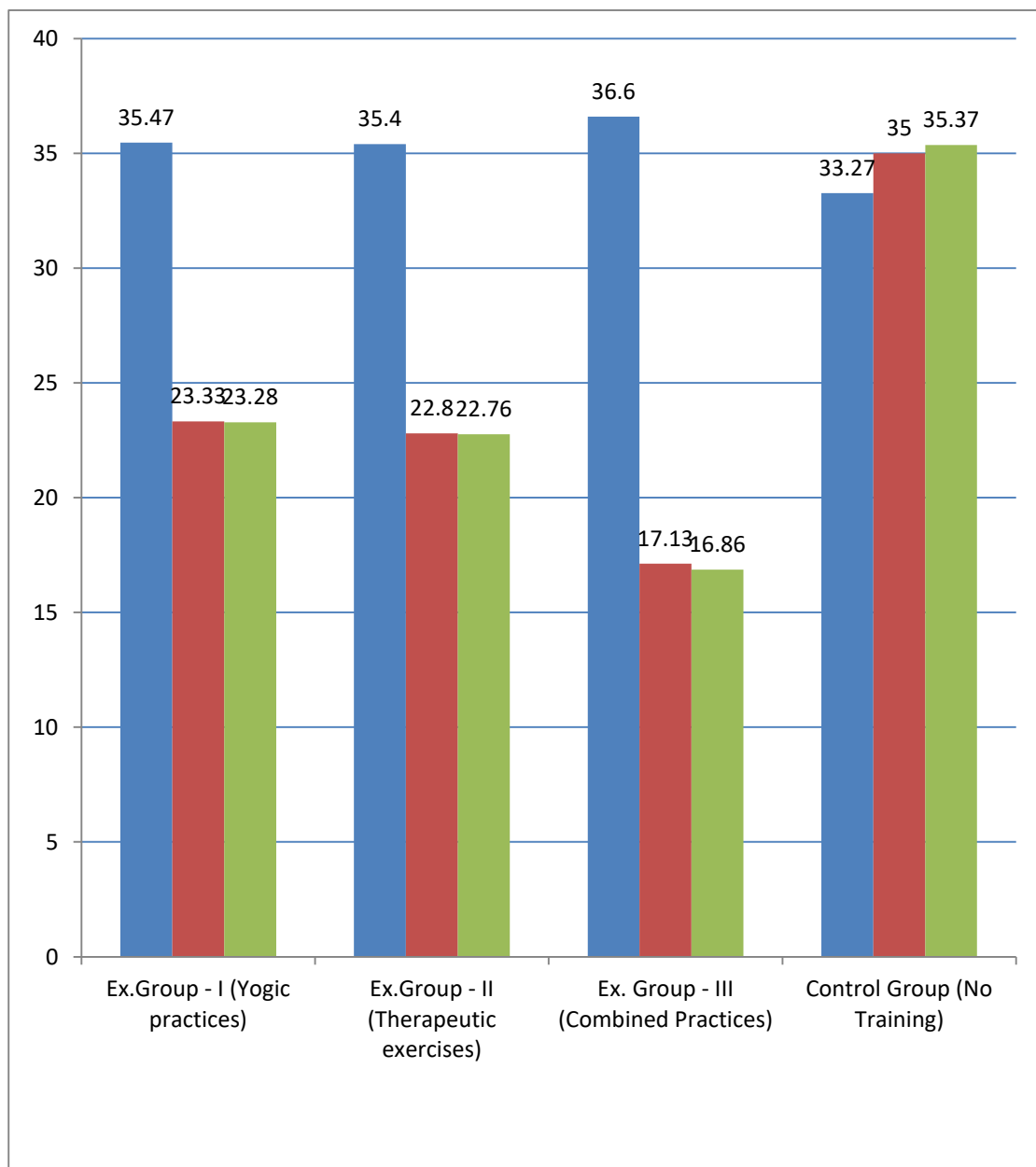
* Significant

Table - XXVI shows that there was significant difference between Yogic practices and control group and Therapeutic exercise group and control group, Combined practices (Yogic practices and Therapeutic exercises) group and control group.

The obtained adjusted mean values were presented through bar diagram in figure 36.

FIGURE - 36

**BAR DIAGRAM SHOWING PRE AND POST-TEST VALUES OF
EXPERIMENTAL GROUP I, II, III & CONTROL GROUP ON ANXIETY**



4.12.1 DISCUSSIONS ON THE FINDINGS OF ANXIETY

The results presented in table XXVI showed that the obtained adjusted means on Anxiety among Yogic practices group was 23.28 followed by Therapeutic exercise group with the mean value of 22.76 followed by Combined practices group (Yogic practices and therapeutic exercises) mean value of 16.86 and control group mean value of 35.37. The difference among pre test scores Post test scores and adjusted mean scores of the subjects were statistically treated using ANCOVA and F values obtained were 1.21, 26.14 and 26.59 respectively. It was found that obtained F value on pre test score was not significant at 0.05 level of confidence as the obtained value was lesser than the required table value and post test Scores was significant at 0.05 level of confidence as the value was greater than the required table F value of 2.77.

The post hoc analysis through Scheffe`s confidence test proved that due to Twelve weeks treatment the Yogic practices group and Therapeutic exercise group and Combined practices group (Yogic practices and therapeutic exercises) there was significant improvement in Anxiety than control group and the differences were significant at 0.05 level. The post hoc analysis between the experimental group namely Yogic practices group and Therapeutic exercise group and Combined practices group (Yogic practices and therapeutic exercises) proved that there was significant difference.

The result of this study on Anxiety has in line with the study conducted by Saeed SA, et.al, (2010).

4.13. RESULTS ON SELF CONFIDENCE

The psychological variable Self confidence was measured through Rekha Agnihortry (1987). The results on the effect of yogic practices, Therapeutic exercise and combined practices on Self confidence among low back ache men is presented in table XXVII.

TABLE XXVII

COMPUTATION OF ANALYSIS OF COVARIANCE OF PRE-TEST, POST-TEST AND ADJUSTED POST-TEST ON SELF CONFIDENCE OF YOGIC PRACTICES, THERAPEUTIC EXERCISE PRACTICES AND COMBINED PRACTICES

(Total Scores in marks)

	EX.GR. I	EX.GR. II	EX.GR. III	Control	Source of Variance	Sum of Squares	df	Mean Squares	Obtained F
Pre Test Mean	20.47	22.20	21.80	21.20	between	25.65	3.00	8.55	0.21
					within	2258.93	56.00	40.34	
Post Test Mean	25.73	24.93	30.80	20.33	between	827.25	3.00	275.75	10.12*
					within	1525.60	56.00	27.24	
Adjusted Post Test Mean	26.19	24.56	30.62	20.44	between	797.31	3.00	265.77	14.41*
					within	1014.53	55.00	18.45	
Mean Diff	5.27	2.73	9.00	0.87					

Table value at 0.05 level of confidence for 3 and 56 (df) is 2.77, 3 and 55 (df) is 2.77.

* Significant at 0.05 level.

Table XXVII shows that the pre test mean scores of Self confidence Experimental group I –Yogic practices was 20.47. Experimental group II–Therapeutic exercise practices was 22.20, Experimental group III - Combined (Yogic practices and Therapeutic exercises) was 21.80 and control group was 21.20. The post test means showed differences due to Twelve weeks of Yogic practices, Therapeutic exercise and combined practices (Yogic practices and Therapeutic exercises) and mean values recorded were 25.73, 24.93, 30.80 and 20.33 respectively.

The obtained F value on pre test scores 0.21 was lesser than the required F value of 2.77 to be significant at 0.05 level. This proved that there was no significant difference between the groups at initial stage and the randomization at the initial stage was equal.

The post test scores analysis proved that there was significant difference between the groups as the obtained F value at 10.12 was greater than the required F value of 2.77. This proved that the differences between the post test mean at the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value at 14.41 was greater than the required F value of 2.77. This proved that there was Significant differences among the means due to Twelve weeks of yogic practices, Therapeutic exercise and combined practices on the Psychological variable self confidence.

Since significant improvement were recorded. The results were subjected to post hoc analysis using Scheffe`s Confidence Interval test. The results were presented in table XXVIII.

TABLE - XXVIII

SCHEFFE'S POST-HOC TEST FOR SELF CONFIDENCE

Control Group	Experimental Group – I (Yogic practices)	Experimental Group – II (Therapeutic exercises)	Experimental Group – III (Combined Practices)	Mean Difference	CI
20.44	26.19			5.75*	4.03
20.44		24.56		4.12*	
20.44			30.62	10.18*	
	26.19	24.56		1.62	
	26.19		30.62	4.43*	
		24.56	30.62	6.06*	

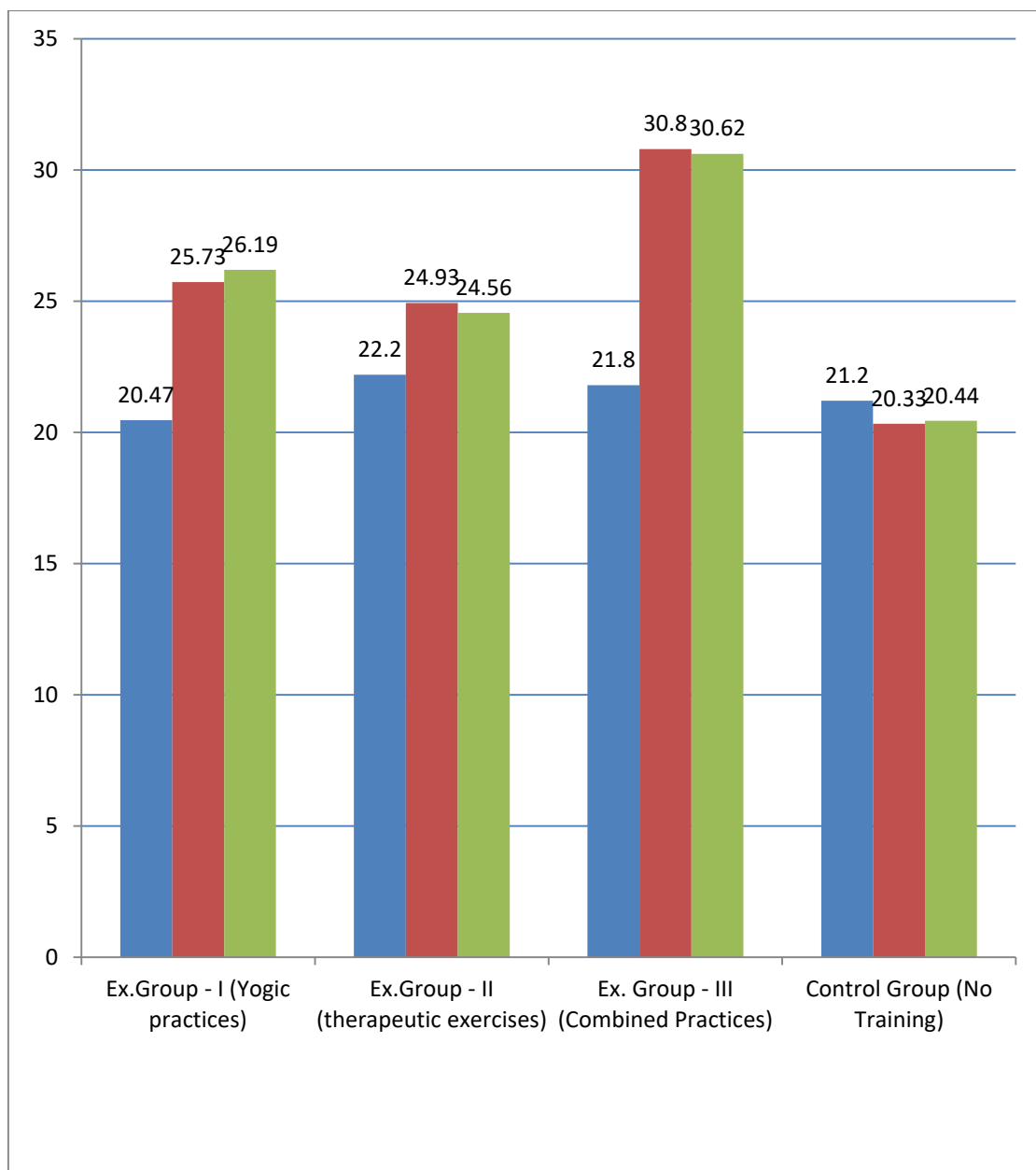
* Significant

Table - XXVIII shows that there was significant difference between Yogic practices and control group and Therapeutic exercise group and control group, Combined practices (Yogic practices and Therapeutic exercises) group and control group.

The obtained adjusted mean values were presented through bar diagram in figure 37.

FIGURE - 37

**BAR DIAGRAM SHOWING PRE AND POST-TEST VALUES OF
EXPERIMENTAL GROUP I, II, III & CONTROL GROUP ON SELF
CONFIDENCE**



4.13.1 DISCUSSIONS ON THE FINDINGS OF SELF CONFIDENCE

The results presented in table XXVIII showed that the obtained adjusted means on Self confidence among Yogic practices group was 26.19 followed by Therapeutic exercise group with the mean value of 24.56 followed by Combined practices group (Yogic practices and therapeutic exercises) mean value of 30.62 and control group mean value of 20.44. The difference among pre test scores Post test scores and adjusted mean scores of the subjects were statistically treated using ANCOVA and F values obtained were 0.21, 10.12 and 14.41 respectively. It was found that obtained F value on pre test score was not significant at 0.05 level of confidence as the obtained value was lesser than the required table value and post test Scores was significant at 0.05 level of confidence as the value was greater than the required table F value of 2.77.

The post hoc analysis through Scheffe`s confidence test proved that due to Twelve weeks treatment the Yogic practices group and Therapeutic exercise group and Combined practices group (Yogic practices and therapeutic exercises), there was significant improvement in Self confidence than control group and the differences were significant at 0.05 level. The post hoc analysis between the experimental group namely Yogic practices group and Therapeutic exercise group and Combined practices group (Yogic practices and therapeutic exercises) proved that there was significant difference.

The result of this study on Self confidence has in line with the study conducted by Geeta S. Pasteyet. Al (2007).

4.14. DISCUSSION ON HYPOTHESES

1. The first hypothesis states that that there would be significant differences in yogic practices group than the control group on selected clinical, physiological and psychological variables among low back ache men. The results presented in the table **XII, XIV, XVI, XVIII, XX, XXII, XXIV, XXVI and XXVIII** on pain, and cadence, range of motion, resting pulse rate, systolic blood pressure, respiratory rate stress, anxiety and self confidence respectively proved that there was significant changes due to twelve weeks of yogic practices. Hence the null hypothesis was accepted as 0.05 level.

2. The second hypothesis states that that there would be significant differences in Therapeutic exercise practices group than the control group on selected clinical, physiological and psychological variables among low back ache men. The results presented in the table **XII, XIV, XVI, XVIII, XX, XXII, XXIV, XXVI and XXVIII** on pain, and cadence, range of motion, resting pulse rate, systolic blood pressure, respiratory rate stress, anxiety and self confidence respectively proved that there was a significant change due to twelve weeks of therapeutic exercises. Hence the null hypothesis was accepted as 0.05 level.

3. The third hypothesis states that that there would be significant differences in combined practices (yogic practices and therapeutic exercises) than the control group on selected clinical, physiological and psychological variables among low backache men. The results presented in the table **XII, XIV, XVI, XVIII, XX, XXII, XXIV, XXVI and XXVIII** on pain, and cadence, range of motion, resting pulse rate, systolic blood pressure, respiratory rate stress, anxiety and self confidence respectively proved that there were significant changes due to twelve

weeks of combined practices (yogic practices and therapeutic exercises). Hence the null hypothesis was accepted as 0.05 levels.

4. The fourth hypothesis states that that there would be significant differences in combined practices (yogic practices and Therapeutic exercises) group than the yogic practices group and Therapeutic exercise group on selected clinical, physiological and psychological variables among low backache men. The results presented in the table **XII, XIV, XVI, XVIII, XX, XXII, XXIV, XXVI and XXVIII** on pain, and cadence, range of motion, resting pulse rate, systolic blood pressure, respiratory rate stress, anxiety and self confidence respectively proved that there were significant changes due to twelve weeks of combined practices (yogic practices and Therapeutic exercises). Hence the null hypothesis was accepted as 0.05 levels.

Thus the researcher has successfully completed the study and presented the results clearly and proceeded with the summary and conclusions along with recommendations in the next chapter.

CHAPTER V

SUMMARY CONCLUSIONS AND RECOMMENDATIONS

5.1 SUMMARY

The purpose of the study was to investigate the effect of yogic practices, Therapeutic exercise practices and combined practices on selected clinical, physiological and psychological variables among low backache men. To facilitate the study, 60 low back ache men were selected at random from magesh physiotherapy clinic, annanagar, Chennai city. In this study Yogic practices were given to experimental group I and Therapeutic exercise practices were given to experimental group II and combined practices (Yogic practices and Therapeutic exercises) were given to experimental group III for the period of twelve weeks. The control group did not participate in any of the practices. The pretest was taken from the subjects before the commencement of the training. The experimental group – I were given training for about twelve weeks i.e. from Monday, Wednesday and Friday (three days a week) and experimental group – II were given training for about twelve weeks i.e. from Tuesday, Thursday and Saturday (three days a week) and combined practices group were given training for about twelve weeks from Monday, Wednesday and Friday (three days a week). The subjects were monitored throughout the sessions. At the end of the twelve weeks training posttest with respect to physiological variables in systolic blood pressure, respiratory rate, resting pulse rate, and psychological variables in stress, anxiety, self confidence and clinical variables in pain, range of motion and cadence were measured using the standardized tests and methods. The significant difference between the means of the experimental group I and Therapeutic exercise were given to experimental group II and Combined

practices (Yogic practices and Therapeutic exercises) and control group for the pre - test and post test scores were determined by analysis of covariance (ANCOVA). The level of significance was fixed at 0.05 level of confidence for the cases to test the hypothesis.

The results proved that there was a significant changes in the clinical, physiological and psychological variables due to twelve weeks of yogic practices, Therapeutic exercise practices and combined practices.

5.2 CONCLUSIONS

Within the limitation and delimitations set for the present study and considering the results obtained, the following conclusion were drawn.

For the purpose of this study it was hypothesized that the experimental group I Yogic practices and experimental group II Therapeutic exercises and experimental group III combined practices (yogic practices and therapeutic exercises) would improve the selected clinical, physiological and psychological variables as compared to the control group.

1. The Physiological variables **Resting pulse rate** was significantly improvement (decrease) due to Twelve weeks of experimental group I Yogic practices and experimental group II Therapeutic exercises and experimental group III combined practices (yogic practices and therapeutic exercises) among low back ache men comparing to the control group.
2. The Physiological variables **Systolic blood pressure** was significantly improvement (decrease) due to Twelve weeks of experimental group I Yogic practices and experimental group II Therapeutic exercises and experimental group III combined practices (yogic practices and therapeutic exercises) among low backache men comparing to the control group.

3. The Physiological variables **Respiratory rate** was significantly improvement (decrease) due to Twelve weeks of experimental group I Yogic practices and experimental group II Therapeutic exercises and experimental group III combined practices (yogic practices and therapeutic exercises) among low back ache men comparing to the control group.
4. The Clinical variables **Pain** was significantly improvement (decrease) due to Twelve weeks of experimental group I Yogic practices and experimental group II Therapeutic exercises and experimental group III combined practices (yogic practices and therapeutic exercises) among low back ache men comparing to the control group.
5. The Clinical variables **Cadence** was significantly improvement (increase) due to Twelve weeks of experimental group I Yogic practices and experimental group II Therapeutic exercises and experimental group III combined practices (yogic practices and therapeutic exercises) among low back ache men comparing to the control group.
6. The Clinical variables **Range of motion** was significantly improvement (increase) due to Twelve weeks of experimental group I Yogic practices and experimental group II Therapeutic exercises and experimental group III combined practices (yogic practices and therapeutic exercises) among low back ache men comparing to the control group.
7. The Psychological variables **Stress** was significantly improvement (decrease) due to Twelve weeks of experimental group I Yogic practices and experimental group II Therapeutic exercises and experimental group III combined practices

(yogic practices and therapeutic exercises) among low back ache men comparing to the control group.

8. The Psychological variables **Anxiety** was significantly improved (decrease) due to Twelve weeks of experimental group I Yogic practices and experimental group II Therapeutic exercises and experimental group III combined practices (yogic practices and therapeutic exercises) among low back ache men comparing to the control group.
9. The Psychological variables **Self-confidence** was significantly improvement (increase) due to Twelve weeks of experimental group I Yogic practices and experimental group II Therapeutic exercises and experimental group III (combined practices (yogic practices and therapeutic exercises) among low back ache men comparing to the control group.
10. The post hoc analysis of the results proved that combined practices (yogic practices and therapeutic exercises) experimental group III was slightly effective than Yogic practices (Experimental Group-I) and Therapeutic exercises (Experimental group II) differences in resting pulse rate, systolic blood pressure, respiratory rate, pain, cadence, range of motion, stress, anxiety and self confidence among low back ache men.

5.3 RECOMMENDATIONS

The following recommendations have been derived on the basis of the study for practitioners.

1. It is found that yogic practices and Therapeutic exercise should be useful for the low back ache men.

2. It is found that the combination of both also yogic practices and Therapeutic exercise are more suitable for the low back ache men.
3. yogic practices and Therapeutic exercise may be recommended for police with back pain for all other diseases for better treatment.
4. yogic practices and Therapeutic exercise may be recommended for management as well as coping the Stress and anxiety.
5. yogic practices and Therapeutic exercise may be recommended mainly for improvement of psychological problem among low back ache men.
6. yogic practices and Therapeutic exercise may be recommended for the improvement of the low back ache men for general health.
7. The government may encourage yogic practices and Therapeutic exercise as a part of health centers in other department.
8. yogic practices and Therapeutic exercise may be included in curriculum in all hospitals.
9. yogic practices and Therapeutic exercise may be done by all the people in their daily routine for regular work.

5.4 SUGGESTION FOR FURTHER RESEARCH

During the course of the research study, the investigator came across a number of ideas, based on which the following suggestions are made for further research in this area.

1. Similar study can be undertaken to find out the changes on yogic practices and therapeutic exercises.
2. Similar study can be undertaken for low back ache men.
3. Similar study can be undertaken for back ache men.
4. Similar study can be undertaken for rural and urban low back ache men.
5. This type of study can be undertaken on different age groups.
6. Since the research was selected on three experimental groups, more experimental groups can be compared for low back ache men.
7. Similar study can be conducted on other clinical, physiological and psychological variables also.
8. Similar study may be conducted for the extension period of experimentation by selecting a large sample.

The present study needed to be strengthened or support by more relevant research studies. Various aspects like socio economic status, motivational aspects, family background and other demographic variables can also be a part of the future extensive and exhaustive research to prove the efficacy of Integrated yoga modules and make use of this wonder filled art and science of yoga for the betterment of humanity.

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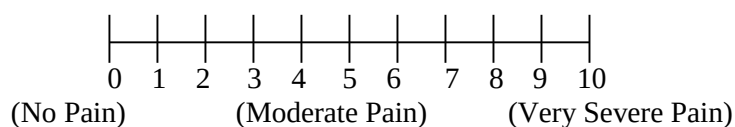
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APPENDIX-A

ASSESSMENT PERFORMA :(PRE-TEST)

1. Name:
2. Age:
3. Sex:
4. Occupation:
5. Address:
6. Whether the Subject Is Psychologically Sound: Yes/No
7. Whether the Subject Is On Medications/Treatment: Yes/No
8. Variables:
 - a). Heart Rate Score:
 - b). Respiratory Rate Score:
 - c). Body Temperature Score:
 - d). Pain (Visual Analogue Scale-VAS)- Score:



- e). Muscle Power: (Oxford classification)
 - 0—No Contraction
 - 1—Flicker of Contraction
 - 2—Weak, small movement with gravity counterbalanced.
 - 3—fair, movement against gravity.
 - 4—Good. Movement against gravity and some resistance
 - 5—Normal
 - Spinal extensors Score
 - Spinal flexors Score

APPENDIX-B

ASSESSMENT PERFORMA :(POST-TEST)

1. Name:
2. Age:
3. Sex:
4. Occupation:
5. Address:
6. Whether the Subject Is Psychologically Sound: Yes/No
7. Whether the Subject Is On Medications/Treatment: Yes/No
8. Variables:
 - a). Heart Rate Score:
 - b). Respiratory Rate Score:
 - c). Body Temperature Score:
 - d). Pain (Visual Analogue Scale-VAS)- Score:

0 1 2 3 4 5 6 7 8 9 10
 (No Pain) (Moderate Pain) (Very Severe Pain)
 - e). Muscle Power: (Oxford classification)

0—No Contraction

1—Flicker of Contraction

2—Weak, small movement with gravity counterbalanced.

3—fair, movement against gravity.

4—Good. Movement against gravity and some resistance

5—Normal

- Spinal extensors Score
 - Spinal flexors Score

APPENDIX C

RAW SCORES ON PAIN

S.No	Experimental Group I (Yogic Practices)		Experimental Group II (Therapeutic Exercises)		Experimental Group III (Combined Practices)		Control Group	
	Pre - test	Post test	Pre - test	Post - test	Pre - test	Post - test	Pre - test	Post - test
1	6	4	8	5	8	6	8	7
2	8	6	7	4	9	3	7	6
3	8	5	7	3	9	3	8	8
4	7	6	9	6	6	4	8	7
5	9	8	6	3	6	5	9	8
6	8	5	7	5	7	5	8	8
7	7	5	8	6	9	4	7	8
8	6	6	5	6	8	4	8	7
9	8	5	8	5	5	3	9	10
10	7	6	7	4	4	2	7	7
11	8	6	7	5	6	4	7	6
12	9	5	9	7	3	3	8	9
13	8	4	5	6	7	3	7	7
14	7	6	7	7	9	3	8	6
15	8	5	6	6	6	4	7	7

APPENDIX D

RAW SCORES ON CADENCE

S.No	Experimental Group I (Yogic Practices)		Experimental Group II (Therapeutic Exercises)		Experimental Group III (Combined Practices)		Control Group	
	Pre - test	Post test	Pre - test	Post - test	Pre - test	Post - test	Pre - test	Post - test
1	71	89	65	83	68	100	69	62
2	80	96	79	67	47	74	75	71
3	79	106	76	76	82	114	70	73
4	59	71	68	90	56	89	74	89
5	79	99	72	63	84	116	80	76
6	62	76	64	82	59	96	72	70
7	57	78	66	87	54	89	71	70
8	75	87	72	94	73	108	82	76
9	70	86	58	76	67	104	70	72
10	73	84	53	74	70	108	76	86
11	81	96	72	90	48	84	77	90
12	67	83	79	101	54	89	81	83
13	80	98	64	86	77	114	74	89
14	78	109	78	94	93	118	75	79
15	77	104	79	102	74	106	72	80

APPENDIX E

RAW SCORES ON RANGE OF MOTION

S.No	Experimental Group I (Yogic Practices)		Experimental Group II (Therapeutic Exercises)		Experimental Group III (Combined Practices)		Control Group	
	Pre - test	Post test	Pre - test	Post - test	Pre - test	Post - test	Pre - test	Post - test
1	70	86	77	99	69	104	98	87
2	86	102	95	98	85	90	85	95
3	79	97	69	93	65	93	82	66
4	90	104	85	102	88	106	90	88
5	67	90	65	106	97	120	76	62
6	74	93	88	101	62	116	91	94
7	89	106	97	98	73	96	84	86
8	108	93	62	102	68	112	86	85
9	94	97	73	94	67	120	88	86
10	75	96	68	108	74	106	84	87
11	105	94	93	103	89	125	94	79
12	87	93	102	102	108	133	87	76
13	65	94	107	101	94	102	87	92
14	76	100	67	91	75	112	89	98
15	72	103	112	97	105	108	89	85

APPENDIX F

RAW SCORES ON RESTING PULSE RATE

Raw date of Resting Pulse Rate								
S.No	Experimental Group I (Yogic Practices)		Experimental Group II (Therapeutic Exercises)		Experimental Group III (Combined Practices)		Control Group	
	Pre - test	Post test	Pre - test	Post - test	Pre - test	Post - test	Pre - test	Post - test
1	78	75	80	76	78	70	80	81
2	77	77	78	76	80	77	78	79
3	78	77	78	78	79	74	79	74
4	78	78	80	77	80	78	79	79
5	75	78	79	77	78	74	78	76
6	78	79	80	77	80	73	78	84
7	78	77	76	74	78	78	78	81
8	78	77	79	79	79	73	78	74
9	80	78	78	77	80	74	78	86
10	79	73	80	74	80	75	79	79
11	79	75	86	77	79	72	79	79
12	84	73	84	78	80	73	80	74
13	80	76	79	75	78	74	81	75
14	77	79	79	77	78	75	80	82
15	77	74	78	76	79	74	79	85

APPENDIX G

RAW SCORES ON SYSTOLIC BLOOD PRESSURE

S.No	Experimental Group I (Yogic Practices)		Experimental Group II (Therapeutic Exercises)		Experimental Group III (Combined Practices)		Control Group	
	Pre - test	Post test	Pre - test	Post - test	Pre - test	Post - test	Pre - test	Post - test
1	140	132	142	131	146	126	142	141
2	142	134	142	130	145	127	139	145
3	141	133	141	132	138	134	137	146
4	142	136	144	132	141	128	139	140
5	141	127	141	134	142	126	139	139
6	141	134	145	131	146	125	142	144
7	142	134	146	141	143	126	141	145
8	140	130	140	138	141	130	144	141
9	145	136	139	132	142	131	141	139
10	142	129	144	136	138	124	145	144
11	141	128	139	134	141	127	146	140
12	141	133	141	135	145	126	140	143
13	145	134	145	131	144	122	139	143
14	139	132	138	137	141	126	136	139
15	139	129	139	129	142	142	136	143

APPENDIX H

RAW SCORES ON RESPIRATORY RATE

S.No	Experimental Group I (Yogic Practices)		Experimental Group II (Therapeutic Exercises)		Experimental Group III (Combined Practices)		Control Group	
	Pre - test	Post test	Pre - test	Post - test	Pre - test	Post - test	Pre - test	Post - test
1	19	16	20	17	22	17	21	23
2	21	20	24	21	19	16	22	21
3	19	21	22	18	20	18	23	21
4	21	20	17	17	20	17	20	22
5	19	20	16	18	22	16	18	20
6	22	21	21	20	21	14	19	22
7	20	20	22	17	22	17	19	23
8	19	21	21	20	23	17	19	25
9	22	17	17	18	21	18	22	20
10	21	21	19	17	20	16	21	21
11	22	17	21	21	21	18	19	22
12	21	20	18	19	22	17	20	22
13	21	17	19	19	22	17	19	24
14	20	17	23	20	19	18	22	23
15	21	21	22	19	21	16	23	19

APPENDIX I

RAW SCORES ON STRESS

S.No	Experimental Group I (Yogic Practices)		Experimental Group II (Therapeutic Exercises)		Experimental Group III (Combined Practices)		Control Group	
	Pre - test	Post test	Pre - test	Post - test	Pre - test	Post - test	Pre - test	Post - test
1	59	45	79	65	78	51	133	125
2	94	95	89	78	71	61	77	74
3	95	105	76	65	75	58	62	70
4	98	75	116	65	88	52	82	97
5	79	68	123	82	76	54	49	54
6	98	72	80	78	81	56	97	89
7	49	71	86	71	86	60	132	126
8	48	65	64	79	86	62	111	115
9	92	65	98	81	79	52	116	100
10	74	52	76	60	81	85	55	64
11	85	42	79	72	91	44	73	81
12	87	28	78	65	87	48	92	98
13	83	64	76	79	89	49	28	30
14	91	105	84	72	86	40	33	47
15	71	61	67	70	85	44	49	45

APPENDIX J

RAW SCORES ON ANXIETY

S.No	Experimental Group I (Yogic Practices)		Experimental Group II (Therapeutic Exercises)		Experimental Group III (Combined Practices)		Control Group	
	Pre - test	Post test	Pre - test	Post - test	Pre - test	Post - test	Pre - test	Post - test
1	37	30	35	22	34	18	42	27
2	36	14	42	21	33	16	30	42
3	35	25	32	21	36	19	41	20
4	41	31	36	22	42	18	28	45
5	45	32	28	21	41	16	31	35
6	35	18	39	29	36	17	21	18
7	35	21	37	22	36	17	32	40
8	36	18	34	22	35	15	32	26
9	21	20	31	21	35	20	26	45
10	34	12	42	23	34	12	43	32
11	36	25	37	28	41	19	34	42
12	37	29	31	22	39	18	38	43
13	42	31	32	24	36	18	39	41
14	30	23	41	21	35	15	33	35
15	32	21	34	23	36	19	29	34

APPENDIX K

RAW SCORES ON SELF CONFIDENCE

S.No	Experimental Group I (Yogic Practices)		Experimental Group II (Therapeutic Exercises)		Experimental Group III (Combined Practices)		Control Group	
	Pre - test	Post test	Pre - test	Post - test	Pre - test	Post - test	Pre - test	Post - test
1	15	22	32	28	30	40	19	19
2	21	34	10	16	24	22	15	18
3	14	24	15	18	30	41	19	18
4	22	22	24	29	10	21	23	19
5	12	19	16	26	18	35	23	22
6	26	25	25	25	12	19	24	21
7	13	33	36	27	19	29	19	23
8	23	25	20	33	31	37	18	20
9	23	24	16	22	34	43	22	19
10	21	29	18	23	20	26	23	23
11	24	32	20	25	21	25	20	22
12	15	21	21	28	16	23	25	21
13	31	27	32	29	15	37	22	21
14	14	21	31	27	24	32	27	20
15	33	28	17	18	23	32	19	19

APPENDIX L

QUESTIONNAIRE ON STRESS BY Dr. LATHA SATISH

List of Situation/Events/Problems	Yes/No	Amount of Control over it		
		Complete Control	Partial Control	No Control
(1) Lack of holiday rest (2) Too much to do at short period (3) Uncertainty of coming days (4) Prices sky rocking (5) Addition of new family Members (6) Lack of domestic help (7) Change in sleeping habits (8) Lack of emotional support at home (9) Career pressure (10) Academic Pressure (11) Very high family pressure to earn more (12) Increased work load at home (13) Pollutions and slum conditions in the locality (14) Lack of job satisfaction (15) Getting married (16) Appearing for examination (17) Lack of understanding between staff in work place (18) Failure in exams or other achievements (19) Discrimination in work place because of your sex/physical characteristics/religion/social status (20) Lack of monetary security (21) Daughters marriage (22) Family conflict (23) Huge loan to be repaid (24) Lack of child (male)				

(25) Unemployment				
(26) Sexual difficulties				
(27) Unwanted pregnancy				
(28) Conflict over dowry (self/spouse)				
(29) Feel a sense of powerlessness or hopeless				
(30) Lack of promotion of incentives				
(31) Heavy responsibility in work situation				
(32) Financial loss or problems				
(33) Decline in social life				
(34) Too much time pressure				
(35) Anxiety about unfulfilled commitments				
(36) illness of family members				
(37) Major personal illness				
(38) Lack of confidence in oneself				
(39) broken love affairs				
(40) Lack of support or excessive expectation from yourself and those around you				
(41) Intense arguments with spouse				
(42) Sense of loneliness				
(43) marital conflict				
(44) Alcoholism/drug addition by family member				
(45) Trouble with parent-in-law				
(46) Suspension or dismissal from job.				
(47) Extreme boredom				
(48) lack of sense of self-worth				
(49) Having a handicapped child				
(50) Marital separation/divorce				
(51) Extra marital relation of spouse				
(52) Death of close family member/Any other.				

APPENDIX M
QUESTIONNAIRE ON ANXIETY

1.	I do not dine quickly.	T	F
2.	I am troubled by attacks of nausea.	T	F
3.	I believe no more nervous than most others.	T	F
4.	I have very few head-aches.	T	F
5.	I cannot keep my mind in one thing.	T	F
6.	I work under a great deal of tension.	T	F
7.	I worry over money and business.	T	F
8.	I frequently notice my head shakes when I try to do something	T	F
9.	I blush no more often than others.	T	F
10.	I have diarrhea once a month or more.	T	F
11.	I worry quite a bit over possible misfortune.	T	F
12.	I practically never blush.	T	F
13.	I am often afraid I am going to blush.	T	F
14.	I have nightmares a very few nights.	T	F
15.	My hands and feet are usually warm enough.	T	F
16.	I sweat very easily even on cool days.	T	F
17.	Sometimes when embarrassed. I break out in sweat which annoys me greatly.	T	F
18.	I hardly ever notice my heart pounding and I am seldom short of breath.	T	F
19.	I feel hungry almost all time.	T	F
20.	I am very seldom troubled by constipation.	T	F

- | | | | |
|-----|---|---|---|
| 21. | I have a great deal of stomach trouble. | T | F |
| 22. | I have had period in which I lost sleep over worry. | T | F |
| 23. | My sleep is fitful and disturbed. | T | F |
| 24. | I dream frequently about things that are best kept to myself. | T | F |
| 25. | I am easily embarrassed. | T | F |
| 26. | I am more sensitive than most other people. | T | F |
| 27. | I frequently find myself worrying about something. | T | F |
| 28. | I wish I could be as happy as others seem to be. | T | F |
| 29. | I am usually calm and not easily upset. | T | F |
| 30. | I cry easily. | T | F |
| 31. | I feel anxiety about something or someone. | T | F |
| 32. | I am happy most of the time. | T | F |
| 33. | It makes me nervous to have wait. | T | F |
| 34. | I have periods of such great restlessness that I cannot sit long in a chair. | T | F |
| 35. | Sometime I become so excited that I find it hard to get to sleep. | T | F |
| 36. | I have sometimes felt that difficulties were piling up so high that I could not overcome them . | T | F |
| 37. | I must admit that I have at times been worried beyond reason over something that easily did not matter. | T | F |
| 38. | I have few fears compared to my friends. | T | F |
| 39. | I have been afraid of things or people that I know could not hurt me. | T | F |
| 40. | I certainly feel useless at times. | T | F |

- | | | | |
|-----|--|---|---|
| 41. | I find it hard to keep my mind on a task or job. | T | F |
| 42. | I am usually self conscious. | T | F |
| 43. | I am inclined to take things hard. | T | F |
| 44. | I am highly strong person. | T | F |
| 45. | At times I am not good at all. | T | F |
| 46. | Life is strain for me much of time. | T | F |
| 47. | I am certainly lacking in self confidence. | T | F |
| 48. | I sometimes feel that I am about to go pieces. | T | F |
| 49. | I shrink from facing a crisis or difficulty. | T | F |
| 50. | I am entirely self-confident. | T | F |

APPENDIX N

QUESTIONNAIRE ON SELF CONFIDENCE by Rekha Agnihortry

1. It always happens to you that you cannot come to a first decision/conclusion till the last moment of your work. T/F
2. Whenever a subject is brought to you/ or asked about the subject you don't hesitate to give answer to it. T/F
3. Whenever you have a meeting with the public you experience self-confidence. T/F
4. Your feeling hurt other. T/F
5. Whenever you don't want to meet some people you change your route. T/F
6. You always fear that others don't like you. T/F
7. Without any distress you confuse on any difficult problems. T/F
8. For a silly thing people unjustly blame. T/F
9. You always deny to play certain games because you know you are not good at it. T/F
10. You always worry/think more an every subject matter. T/F
11. You don't plainly explain your feeling. T/F
12. You think every one is always interested to get the best out of you. T/F
13. Whenever you start a work you have the fear of loosing/not succeeding it. T/F
14. At times when needed you feel that you are unable to give the correct answer that expresses your feelings. T/F
15. You feel life is very strenuous. T/F
16. You get yourself back to face any problems. T/F
17. To keep yourself concentrate on a subject is very difficult. T/F
18. Most of the times you have neglected to do work the assignment has given to you. Because you feel that are incapable of doing it. T/F
19. You feel that you are not facing the problems in an orderly manner. T/F

20. You spend most of your time simply thinking of your future. T/F
21. You have lost some of your golden chances because you are unable to take a quick and final decision. T/F
22. It is believed that you always live in a depressed mood. T/F
23. You make friendship in no time as other do. T/F
24. Whenever your feelings do not match with others you feel much discouraged. T/F
25. It is believed that you are satisfied with (your imaginary thoughts) your impossible wishes. T/F
26. You don't have a positive way to take an any job. T/F
27. You get discouraged immediately. T/F
28. Whenever you get upset it takes more time for you to get back to normality. T/F
29. You feel that nobody understands you. T/F
30. Some times you feel discomfort (or) uneasy to sit quietly in one place. T/F
31. When you are single you experience yourself courage and boldness. T/F
32. You are simple and you feel yourself that there is no one for you. T/F
33. You feel difficult to have conversation with your superiors. T/F
34. You face difficulty in making new friends. T/F
35. At any social gathering discussion instead of active participation you keep yourself aloof/ away. T/F
36. You feel yourself insecure. T/F
37. It is difficult for you to speak before a large gathering. T/F
38. Whenever some one looks at you, you can't do better than normally you do the job. T/F
39. Whenever some one comments either favorably you feel distressed. T/F
40. You admire yourself a man of success. T/F
41. You always feel that whatever you want to do you can do it. T/F
42. You feel difficult to take a firm decision of your own. T/F

43. Whenever you want to move a coin against your enemy you feel you have done it. T/F
44. You make your decision knowing fully what should be the next step. T/F
45. To keep yourself mentally relaxed by not storming the brain. T/F
46. You feel much against with those who humiliate the atmosphere. T/F
47. You feel thinking that a large man is not a worthy man. T/F
48. You are so sensitive, that you start crying immediately. T/F
49. You experience nervousness before you enter a meeting hall. T/F
50. You frustrated because whatever you (think or work) want to do, you feel unable to do it. T/F
51. You feel your friend had done something good for his life or living or he is doing well better than you. T/F
52. You always live in a state of confusion. T/F
53. When you get a chance to become a good leader, or a good politician, you avail it. T/F
54. You feel that no promises can stop you to achieve in any party or a good gathering. T/F
55. You feel back yourself in your natural style in any party or a good gathering. T/F
56. Whenever you are to face a difficult task or to face a tough time you feel that you do not do it what is necessary. T/F



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EFFECT OF YOGIC PRACTICES ON SELECTED PSYCHOLOGICAL VARIABLES AMONG LOW BACKACHE MEN

T. Ekambaram¹ and Dr. R. Jayachandaran²

¹Ph.D. Research Scholar, Department of Physical Education, Poompuhar College, Melaiyur, Sirkali, Nagapattinam, Tamil Nadu.

²Director, Research Department of Physical Education, Poompuhar College, Melaiyur, Sirkali, Nagapattinam, Tamil Nadu.

ABSTRACT

The purpose of the study was to find out the effect of yogic practices on selected psychological variables among low backache men. To achieve the purpose of this study, 30 low backache men was chosen as subjects from various clinics in Chennai and their age shall ranged from 30 to 40. The subjects were divided into two equal groups. The study was formulated as a true random group design, consisting of a pre-test and post-test. The subjects (N=30) were randomly assigned to two equal groups of fifteen backache men each. The groups were assigned as yogic practices and control group and in an equivalent manner. The training group participated the training for a period of six weeks and the post-tests were conducted. Analysis of Covariance (ANCOVA) was used to test the treatment effect of the training programmes on all the variables used in the study. The variable to be used in the present study was collected from all subjects before they have to treat with the respective treatments. It was assumed as pre-test. After completion of treatment they were tested again as it was in the pre-test on all variables used in the present study. This test was assumed as post-test. It was observed that the yogic practices have significantly improved psychological variables among low back ache men in the age group of 30 to 40 years.



KEY WORDS: Yogic Practices, Stress, Self-confidence, Backache.

INTRODUCTION

Maharishi Patanjali, the father of modern concept of yoga and a great physician himself, in the 300 BC defined yoga as the complete mastery of mind and emotions. Unlike so many other philosophies of the world, it is a scientific philosophy that is wholly practical. Yoga is an exact science which has its foundation on certain immutable laws of nature and establishes "Mind over body". The gaining of a healthy body with a calm and steady mind under all circumstances is the common aspiration of every individual. The word yoga is derived from the Sanskrit word "Yuj" which means Control or 'unite'. Both these words quite adequately give the meaning of "yoga".

Yoga can help to check any imbalance in muscular development and will enable both mind and body to function more efficiently. Practising of yoga asanas strengthen the muscles, release physical tension and improve concentration and poise. Yoga makes limbs balanced strong and relaxed. The standing poses improve balance and muscle flexibility. Yogic practice can help players to relax and replenish their energy after strenuous games. It also promotes calm, clear thinking even in situations that call for fast reactions.

METHODOLOGY

The purpose of the study was to find out the effect of yogic practices on selected psychological variables among low backache men. To achieve the purpose of the study, the investigator selected thirty low backache men as subjects from various clinics in Chennai, Tamil Nadu and their age shall ranged from 30 to 40. The subjects were divided into two equal groups. The study was formulated as a true random group design, consisting of a pre-test and post-test. The subjects (n= 30) were randomly assigned to two equal groups of fifteen backache men each. The groups were assigned as yogic practices and control group and in an equivalent manner. The training group participated the training for a period of six weeks and the post-tests were conducted. Analysis of covariance (ANCOVA) was used to test the treatment effect of the training programmes on all the variables used in the study. The variable to be used in the present study was collected from all subjects before they have to treat with the respective treatments. It was assumed as pre-test. After completion of treatment they were tested again as it was in the pre-test on all variables used in the present study. This test was assumed as post-test.

Tools

- Sports Self-confidence Scale by Robin S. Valley.
- Everlyn and Girdano's Stress Scale.

Results

Table 1: Analysis of Covariance of Self-Confidence of Experimental and Control Groups

	Experimental Group	Control Group	Source of Variance	Sum of Squares	df	Mean Square	F
Pre-Test Mean	66.60	71.73	BG	197.63	1	197.63	2.41
			WG	2290.53	28	81.80	
Post-Test Mean	82.20	69.53	BG	1203.33	1	1203.33	14.41*
			WG	2338.13	28	83.50	
Adjusted Post Mean	82.60	69.13	BG	1252.66	1	1252.66	14.82*
			WG	2282.07	27	84.52	

**Significant at 0.05 level.*

Table-1 shows that the adjusted mean value of self-confidence of experimental and control groups were 82.60 and 69.13 respectively. The F-value of self-confidence for adjusted mean 14.82 is greater than the table value 4.21 for df 1 and 27 at 0.05 level of significance. This indicates that there is significant difference between experimental and control groups on self-confidence. Table-1 also indicates that both pre- and post-test means of experimental and control groups differ significantly.

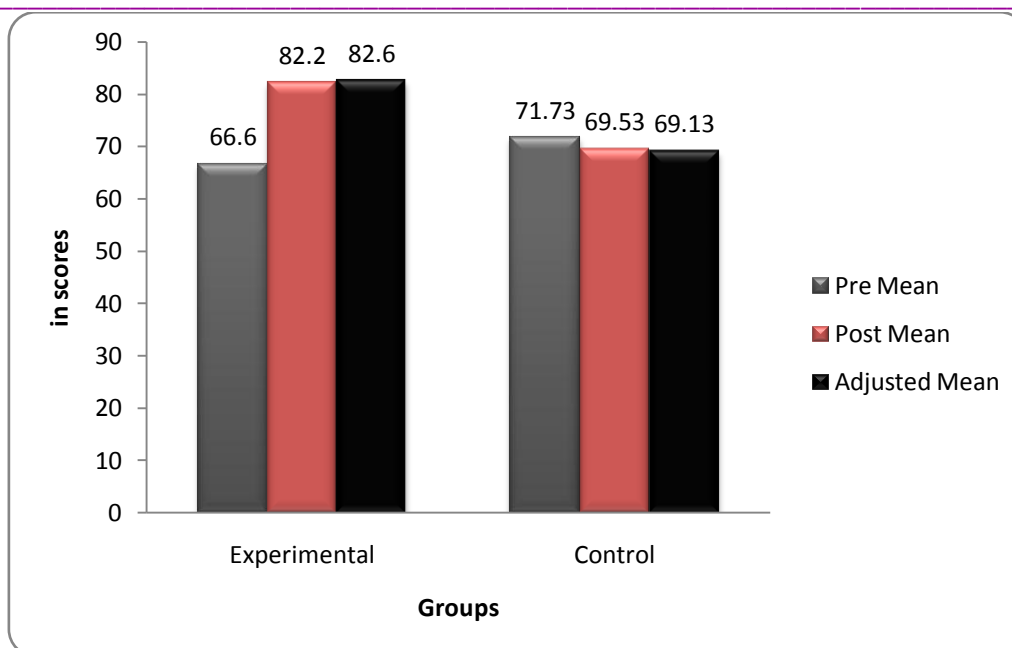


Fig 1: Mean Values on Self-Confidence of Experimental and Control Groups

Table 2: Analysis of Covariance of Stress of Experimental and Control Groups

	Experimental Group	Control Group	Source of Variance	Sum of Squares	df	Mean Square	F
Pre-Test Mean	44.40	42.60	BG	24.30	1	24.30	0.70
			WG	971.20	28	34.68	
Post-Test Mean	26.06	44.80	BG	2632.03	1	2632.03	99.14*
			WG	743.33	28	26.54	
Adjusted Post Mean	25.95	44.91	BG	2631.89	1	2631.89	97.72*
			WG	727.14	27	26.93	

**Significant at 0.05 level.*

Table-2 reveals that the adjusted mean value of stress of experimental and control groups were 25.95 and 44.91 respectively. The F-value of stress for adjusted mean 97.72 is greater than the table value 4.21 for df 1 and 27 at 0.05 level of significance. This shows that there is significant difference between experimental and control groups on stress. Table-2 also indicates that both pre- and post-test means of experimental and control groups differ significantly.

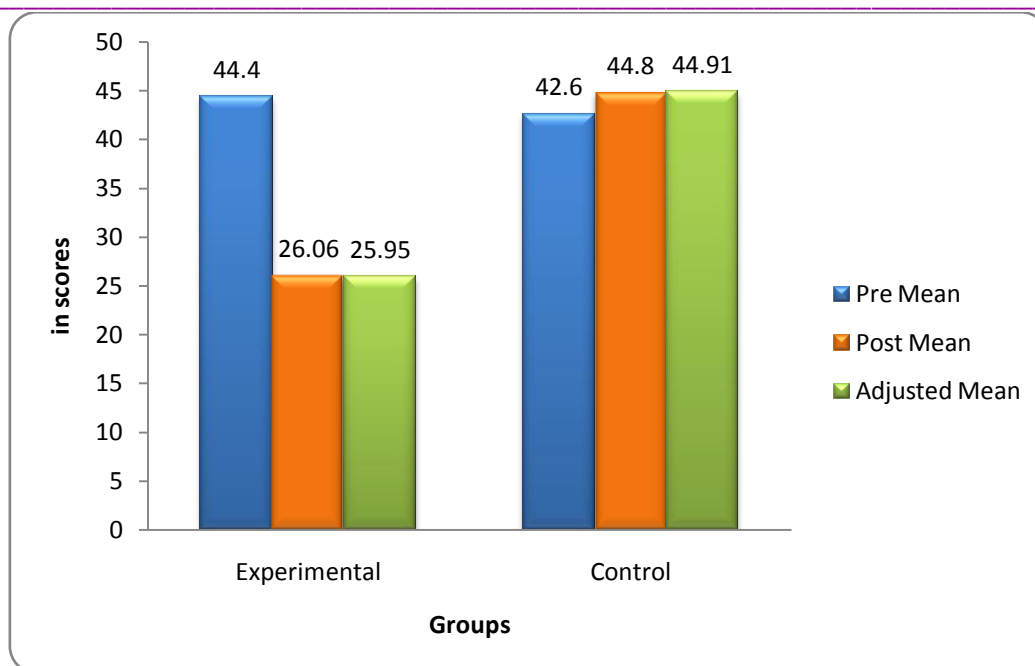


Fig 2: Mean Values on Stress of Experimental and Control Groups

CONCLUSION

The present study concluded that yogic practices have significantly improved psychological variables among low back ache men in the age group of 30 to 40 years.

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EFFECT OF YOGIC PRACTICES AND THERAPEUTIC EXERCISES ON SELECTED BIOCHEMICAL VARIABLES AMONG LOW BACKACHE MEN

T. Ekambaram¹ and Dr. R. Jayachandran²

¹Ph.D. Research Scholar, Department of Physical Education, Poompuhar College, Melaiyur, Tamil Nadu.

²Director of Physical Education, Research Department of Physical Education, Poompuhar College, Melaiyur, Tamil Nadu.

ABSTRACT

Consequently, organisms a complex network of antioxidant metabolites and enzymes that work together to prevent to prevent oxidative damage to cellular components such as DNA, proteins and lipids. During exercise, oxygen consumption can increase by a factor of more than 10. This leads to a large increase in the production of oxidants and results in damage that contributes to muscular fatigue during and after exercise. Yoga, a form was designed to find to find out the effect of yogic practices and therapeutic exercises on selected biochemical variables among low backache men. Totally 60 low back ache men subjects were selected randomly as subjects and their age randomly as subjects and their age ranged between 30-40 years. They were divided into three groups of fifteen each. Group I served as Yogic practices; Group II Therapeutic Exercises and group III as control group. The data collected before and after the training programme. Data was analyzed by using ANCOVA and Scheffe's Post Hoc test. The study concluded that the yogic practices and therapeutic exercises significantly decrease the cholesterol and triglycerides among men low back ache than the control group.

KEY WORD: Yogic Practices, Therapeutic Exercises, Cholesterol, Triglycerides.

INTRODUCTION:-

In general, antioxidant systems either prevent these reactive species from being formed, or remove them before they can damage vital components of the cell. However, since reactive oxygen species do have useful functions in cells, such as redox signaling, the function of antioxidant systems is not to remove oxidants entirely, but instead to keep them at an optimum level.

During exercise, oxygen consumption can increase by a factor of more than 10. This leads to a large increase in the production of oxidants and results in damage that contributes to muscular fatigue during and after exercise. The inflammatory response that occurs after strenuous exercise is also associated with oxidative stress, especially in the 24 hours after an exercise session.

Yogic techniques are known to improve ones overall performance. Pranayama is known to be a part of yogic techniques. Patanjali in its yoga sutra describes - Yama, Niyama, Asana, Pranayama, Pratyahara, Dharana, Dhyana and Samadhi as eight angas (parts) of yoga (Yoga Sutra of Patanjali, cited by Christopher (2008). Amongst them, in the present materialistic world, the third and fourth part, Pranayama and Asana (Postures) are considered as very important parts and prescribed by modern medicine too. De Lateur defined therapeutic exercise as the prescription of bodily movement to correct impairment, improve musculoskeletal function, or maintain a state of well-being. It may vary from highly selected activities



restricted to specific muscles or parts of the body, to general and vigorous activities that can return a convalescing patient to the peak of physical condition.

OBJECTIVE

- To find out the effect of yogic practices and therapeutic exercises on selected biochemical variables among low backache men.

METHODS AND MATERIALS

60 low back ache men were selected randomly as subjects and their age ranged between 30-40 years. The selected subjects were divided into three groups, namely, yogic practices group, therapeutic exercises group and control group, consisting of 15 subjects in each. The selected yogic practices group was given Ardhakatichakrasana, Ardhashakraasana, Parivarthatrikonaasana, Bhujangaasana, Salabhaasana, Vakrasana (twisted pose), ustraasana (**camel shaped asana**) Nadi Sodhana (Alternate Nostril Breathing), SarnaVritti Pranayama (Equal Breathing), Bastrika Pranayama (Bellow Breath) and relaxation for 6 weeks. The therapeutic exercises group was Double knee-to-chest stretch, Pelvic tilt exercise, Lower trunk rotation stretch, Curl-up exercise, Trunk flexion stretch, alternate arm- leg extension exercise, given for 6 weeks. The control group was not exposed to any treatments and was strictly under control. Lipid profiles, which have direct influence on antioxidant status, total cholesterol and triglycerides were tested prior to and after the experiment treatment from all the three groups. Boehringer-Manheim kit was used to measure the selected variables. The differences between the initial and final scores were considered. The collected data were analysed through ANCOVA and if significant differences were recorded post hoc test using scheffe's confidence Interval test was done to compare the differences between paired means.

RESULTS AND DISCUSSIONS

Table 1: Results on Calculation of Analysis of Covariance (Scores in mg/dl)

Calculation of Analysis of Covariance on Blood Cholesterol								
	Ex.Gr. I	Ex.Gr. II	Control Group	Source of Variance	Sum of Squares	Df	Mean Squares	F
Pre Test Mean	175.25	176.99	173.87	Between Groups	569.7	2	284.87	1.91
Std. Deviation	7.88	8.22	9.06	Within Groups	5576.2	57	97.83	
Post Test Mean	164.84	167.22	173.69	Between Groups	839.3	2	419.63	6.82*
Std. Deviation	8.18	10.84	8.77	Within Groups	4966.0	57	87.12	
Adjusted Post Test Mean	166.16	168.32	173.27	Between Groups	1744.1	2	872.04	14.43*
				Within Groups	347.8	56	6.21	
Calculation of Analysis of Covariance on Triglycerides								
Pre Test Mean	165.0	162.0	161.7	Between Groups	129.3	2	64.6	1.08
Std. Deviation	6.6	6.8	12.2	Within Groups	4515.7	57	79.2	
Post Test Mean	153.1	156.2	162.3	Between	882.6	2	441.3	14.7*

				Groups				
Std. Deviation	8.5	6.3	13.0	Within Groups	5312.2	57	93.2	
Adjusted Post Test Mean	151.4	157.0	163.3	Between Groups	1384.5	2	692.3	
				Within Groups	2245.8	56	40.1	17.3*

Required F $(_{0.05, 2, 57}) = 3.15$ *Significant

Table 2: Results of Scheffe's Post Hoc Analysis

Post Hoc Analysis for Blood Cholesterol				
Ex.Gr. I	Ex.Gr. II	Control Group	Mean Difference	Req C.I
166.2	167.22		1.02	2.9
166.2		176.3	10.1*	2.9
	167.22	176.6	9.38*	2.9
Post Hoc Analysis for Triglycerides				
151.4	157.0		5.6*	5.1
151.4		163.3	11.9*	5.1
	157.0	163.3	6.3	5.1

The obtained results proved that six weeks of yogic practices and therapeutic exercises treatments have been significantly moderated the blood cholesterol and triglycerides ($p < 0.05$) than the control group as the obtained values were greater than the paired differences of means between yogic practices group and control group, therapeutic exercises group and control group were significant. It was also found that yogic practices group was significantly better than therapeutic exercises group in reducing blood cholesterol and triglycerides.

CONCLUSION

The yogic practices and therapeutic exercises significantly decrease the cholesterol and triglycerides among men low back ache than the control group.

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**EFFECT OF YOGIC PRACTICES THERAPEUTIC EXERCISES
AND COMBINED PRACTICES ON SELECTED CLINICAL
PHYSIOLOGICAL AND PSYCHOLOGICAL VARIABLES
AMONG LOW BACK ACHE MEN**

A Dissertation

*Submitted to Bharathidasan University through the Research
Department of Physical Education, Poompuhar College
(Autonomous), Melaiyur, Nagapattinam in partial fulfillment of the
requirements for the Degree of*

DOCTOR OF PHILOSOPHY IN PHYSICAL EDUCATION

By

T. EKAMBARAM
(Reg.No.48460)

Under the supervision of

Dr. R.JAYACHANDRAN M.P.Ed., M.Phil., Ph.D.,
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YOGA POSES

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Standing Forward Bend

STRETCHING



Pyramid



Downward Facing Dog



Garland



Seated Forward Bend



Bound Angle



Head to Knee Forward Bend



Half Lord of the Fishes



Hero



Wide-Angle Seated Forward Bend

BALANCE



Tree



Lord of the Dance



Eagle



Standing Split



Half Moon



Warrior III



Handstand



Crow



Extended Hand-to-Big Toe



Dancing Shiva

STRENGTH



Warrior I



Warrior II



Goddess



Humble Warrior



Four-Limbed Staff



Upward Plank



Chair



Dolphin



Triangle



High Lunge

CORE



Plank



Side Plank



Boat



One-Legged Downward Dog



Scale

BACKBENDING



Cobra



Upward Facing Dog



Locust



Bow



Camel



Reclining Hero



One-Legged King Pigeon



Upward Bow

RESTORATIVE / WARM DOWN



Legs Up the Wall



Shoulder Stand



Plow



Easy



Happy Baby



Reclining Bound Angle



Reclining Hand to Big Toe



Supine Spinal Twist



Half Pigeon



Corpse

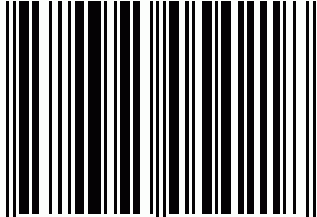
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